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PREFACE.

THE cultivation of the sheep and the manufacture of the fleece have, from the earliest period of history, formed the most important branches of the agriculture and the commerce of Great Britain. Many years did not pass after the subjugation of our island by the Romans, ere the most valuable and expensive woollen robes, and worn on days of ceremony alone, were furnished by the British factories. The language of Dionysius Alexandrinus, quoted in the present volume, could be justified only on the supposition of very superior excellence: "The wool of Britain is often spun so fine, that it is in a manner comparable to the spider's thread."

It was not in the larger factories alone that the conversion of the fleece of the sheep into fabrics of various kinds was carried on; this formed a constant and a large portion of the domestic employment, and that not only in the cottage, but in the palace. The mother and the sisters of that patriot monarch, Alfred, whose name will be venerated as long as British liberty remains, devoted much of their leisure time to the labours of the spinning-wheel. So universal, in fact, was this employment, and, consequently, so numerous the animals from whom the material was obtained, and the fabrics that were devoted to domestic use, that the sheep and its wool were early and unequivocally acknowledged to be the foundation of the national prosperity and wealth. Wool became the substitute for money. Did any domestic contention exist, so many pounds of it were demanded from each vassal—was any foreign enterprise attempted, the wool furnished the sinews of war—or, was a monarch to be released from captivity, the ransom was calculated by the number of sacks of wool. In all the middle periods of British history, the fleece was the expression and the measure of national prosperity or calamity.

If, in process of time, other branches of commerce should be opened, and particularly the introduction of the silk manufacture begin in some measure to lessen the demand for woollen goods, and the establishment of the cotton trade cause a complete revolution in the consumption and the value of the staple commodity of the kingdom, still the sheep and its fleece are objects of paramount importance. No fewer than 32,000,000 of these useful animals graze on our pastures. Exclusive of the value of the carcase, that of the fleece alone cannot be less than seven millions of pounds sterling, employing nearly 350,000 individuals, and ultimately yielding manufactures to the amount of at least twenty-one millions of pounds annually.

The recollection and the deep impression of these things must be pleaded, if apology is necessary, as an excuse for the laboured detail, given

in this volume, of the history of the sheep from the earliest period to the present day—and also for the minuteness with which the different qualities of the fleece and the different manipulations of the manufacture have been described.

To the discovery of the serrated construction of the fibre of wool, so beautifully explaining its felting property, the author does beg leave to assert his unequivocal claim. More than one physiologist had maintained that a structure like this would best account for the property of felting; but the author of this work was the first who had seen and given ocular demonstration of its existence, and of the increasing number and firmness of the serrations in proportion to the felting property of the wool on the one hand, and their decrease in development and in number where that quality failed. The microscope of Mr. Powell fully and fairly brought this out. It was one of extraordinary power. In other microscopes which the author has had especially constructed, the serrated edge remains, but not that difference of serration which would enable the examiner to pronounce *unhesitatingly and accurately* on the character of the wool. He pledges himself, however, to follow up the inquiry—an inquiry which will be successfully pursued by some observer at no distant time; and, when he is enabled honestly to do so, he will publish a collection of the microscopic appearances of different wools, with an especial regard to their felting and manufacturing qualities.

The medical treatment of sheep is comparatively a new subject. The author has to acknowledge many very important communications from old and valued friends. He does flatter himself that some addition has been made to the stock of veterinary knowledge as it regards this animal; and he trusts that the time is not far distant when the good common sense of the British Farmer, and the determination of a wise and patriotic government, will cause a knowledge of the diseases, and general management of these useful animals, to form a prominent object in the education of the veterinary surgeon.

W. YOUATT.

June 15th, 1837.

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THE SHEEP.

Chapter I.

The Zoological Character of the Sheep—The different Names applied to it according to its Age—The Marks by which its Age may be ascertained, and the natural Duration of its Life—Description of the Teeth.

The Sheep, according to Cuvier*, belongs to the Order Ruminantia; having teeth in the lower jaw only, opposed to a callous substance in the upper jaw; six molar teeth on either side, and the joint of the lower jaw adapted for a grinding motion; four stomachs, and these, with the œsophagus, so constructed that the food is returned for the purpose of rumination; long intestines not cellated:

—the Tribe Capridæ; the horns, where they are found, being permanent; placed on a vascular bony basis or process; the horny sheath receiving its increase by annual ringlets at the base, forming deep sulci around the horn, with others as deep running longitudinally, and dividing the surface of the horn into a succession of irregularities or knots. The general structure light, and adapted for springing or swiftness; the ears usually erect and funnel-shaped; the pupils of the eye oblong, and there not being any canine teeth in the mouth:

—the Genus Ovis; with or without horns, and these, where present, taking more or less a spiral direction; the forehead or outline of the face convex; no lacrymal or respiratory opening under the eye; the nostrils lengthened and terminating without a muzzle; no beard; the body covered with short close hair with a downy wool beneath, and, in a domestic state, the wool prevailing over the hair, or quite superseding it; the legs slender, yet firm, and without brushes or callosities.

Of these there are three varieties: the Ovis Ammon, or Argali; the Ovis Musmon, or Musmon; and the Ovis Aries, or Domestic Sheep. The two first will be described in a future chapter, the last will form the principal subject of this work.

There is considerable resemblance between the ovis or sheep, and the capra or goat, another genus of the tribe Capridæ, the history and uses of which will be described in the after part of this volume. The distinctions between them are chiefly these: many sheep are without horns; the horns of sheep have a spiral direction, while those of the goat have a direction upwards and backwards; the forehead of sheep is convex, and that of the goat concave; the sheep has, except in one wild variety, nothing resembling a beard, but the goat is bearded; while the goat, in his highest state of improvement, and when he is made to produce wool of a fineness unequalled by the sheep, as in the Cashmere breed, is mainly, and always externally, covered with hair, the hair on the sheep may, by domestication,

* Animal Kingdom, Synopsis.

be reduced to a few *kemps* (coarse hairs), or got rid of altogether; and finally, the pelt or skin of the goat has a thickness very far exceeding that of the sheep.

Agriculturists have applied different names to the sheep according to its sex and age.

The male is called a *ram* or *tup*. While he is with the mother he is denominated a *tup* or *ram-lamb*, a *heeder;* and in some parts of the west of England, a *pur-lamb*. From the time of his weaning, and until he is shorn, he has a variety of names: he is called a *hog*, a *hogget*, a *hoggerel*, a *lamb-hog*, a *tup-hog*, or a *teg;* and, if castrated, a *wether hog*. After shearing, when probably he is a year and a half old, he is called a *shearing*, a *shearling*, a *shear-hog*, a *diamond* or *dinmont ram*, or *tup;* and a *shearing wether*, &c., when castrated. After the second shearing he is a *two-shear ram*, or *tup*, or *wether;* at the expiration of another year he is a *three-shear ram*, &c.; the name always taking its date from the time of shearing.

In many parts of the north of England and Scotland he is a *tup-lamb* after he is salved, and until he is shorn, and then a *tup-hog*, and, after that, a *tup*, or if castrated, a *dinmont* or a *wedder*.

The female is a *ewe*, or *gimmer lamb*, until weaned; and then a *gimmer hog*, or *ewe hog*, or *teg*, or *sheeder ewe*. After being shorn she is a *shearing ewe* or *gimmer*, sometimes a *theave*, or *double-toothed ewe* or *teg;* and afterwards, a *two-shear*, or *three-shear*, or a *four* or *six-tooth ewe* or *theave*. In some of the northern districts, ewes that are barren, or that have weaned their lambs, are called *eild* or *yeld* ewes.

The age of sheep is not reckoned from the time that they are dropped, but from the first shearing, although the first year may thus include fifteen or sixteen months, and sometimes more.

When there is doubt about the age of a sheep, recourse is had to the teeth, for there is even more uncertainty about the horn in horned sheep than there is in cattle; and ewes that have been early bred from, will always, according to the rings on the horn, appear a year older than others that, although of the same age, have been longer kept from the ram.

It has already been stated, that sheep have no teeth in the upper jaw, but the bars or ridges of the palate thicken as they approach the fore part of the mouth; there also the dense, fibrous, elastic matter of which they are constructed, becomes condensed, and forms a cushion or bed that covers the convex extremity of the upper jaw, and occupies the place of the upper incisor or cutting teeth, and partially discharges their function. The herbage is firmly held between the front teeth in the lower jaw and this pad, and thus partly bitten, and partly torn asunder. The nodding motion of the head of the sheep is a sufficient proof of this.

This animal is one of those especially destined to support man with his flesh; and that he may be able to do this with the least possible expenditure of food, and to extract the whole of the nutriment which the herbage contains, a provision common to all ruminants (as will hereafter be more fully explained) is made in the construction of the stomachs, and other parts of the digestive apparatus. As the first process by which the food is prepared for digestion, it is macerated for a considerable time in the paunch. The frequent and almost necessary consequence of the long continuance of the food in this stomach, exposed to the united influence of heat and moisture, will be the commencement of fermentation and decomposition, and the extrication of a considerable quantity of injurious gas. This often takes place, and many sheep are destroyed by the distension of the paunch caused by this extrication of gas. The process of fermentation

and decomposition is accompanied by the presence or development of an acescent principle. It has been stated that an elastic pad occupies the place of teeth in the upper jaw; and that it is by a half biting and half tearing action that the sheep gathers his food: the necessary consequence is, that some of the grass, of harder construction than the rest, does not give way, but is torn up by the roots; a portion of the mould adheres to the roots, and is swallowed, and, all our soils containing more or less absorbent or calcareous earth, the acid is neutralized, and, as it were, removed, as rapidly as it is formed; except in some extreme cases, attributable almost entirely to the neglect or thoughtlessness of the proprietor of the sheep.

The teeth of the sheep are the same in number as in the mouth of the ox. There are eight incisor or cutting teeth in the fore part of the lower jaw, and six molars in each jaw above and below, and on either side. The incisors are more admirably formed for the purpose of grazing than in the ox. The sheep bites closer than the ox; he was destined to live where the other would starve: he was designed in many places to follow the other, and to gather sufficient nourishment where the ox would be unable to crop a single blade. Two purposes are answered by this: all the nutriment that the land produces is gathered from it, and the pasture is made to produce more herbage than by any other means it could be forced to do. The sheep by his close bite not only loosens the roots of the grass, and disposes them to spread, but by cutting off the short suckers and sproutings, —a wise provision of nature—causes the plant to throw out fresh, and more numerous, and stronger ones, and thus improves and increases the value of the crop. Nothing will more expeditiously or effectually make a thick permanent pasture than its being occasionally and closely eaten down by sheep.

In order to enable the sheep to bite thus close, the upper lip is deeply divided, and free from hair about the centre of it.

The stalks of the common herbage of the field, bitten thus closely as they are by the sheep, are harder and more fibrous than the portions that are divided and cropped by cattle; and not only so, but some breeds of sheep are destined to live, in part at least, on harder food than falls to the lot of cattle, as the different kinds of heath, or substances almost as difficult to be broken off as the branches of the heath. The incisor teeth are evidently formed for browsing on these dense productions of the soil, which would otherwise be altogether useless and lost. The part of the tooth above the gum is not only, as in other animals, covered with enamel to enable it to bear and to preserve a sharpened edge, but the enamel on the upper part rises from the bone of the tooth nearly a quarter of an inch, and, presenting a convex surface outwards, and a concave one within, forms a little scoop or gouge capable of wonderful execution. He who will take the trouble to compare together the incisor teeth of cattle and of sheep—both ruminants—both by means of the half-cutting and half-tearing action having the stomach, in which the process of maceration is going forward, abundantly supplied with absorbent or alkaline earth—the one, however, destined to crop little more than the summit of the grass, and the other to go almost close to the roots, and occasionally to browse on harder food—will have a not uninteresting illustration of the manner in which every part of every animal is adapted to the situation in which he is placed, and the destiny he is to fulfil. The pad also is firmer and denser than in cattle, yet sufficiently elastic, so that it is in no danger of injury from the sharp chisels below, while the interposed substance is cut through with the greatest ease.

The mouth of the lamb newly dropped is either without incisor teeth, or it has two. The teeth rapidly succeed to each other, and before the animal is a month old he has the whole of the eight. They continue to grow with his growth until he is about fourteen or sixteen months old.

Fig. 1.



Fig. 2.



Fig. 3.





Fig. 4.



Fig. 5.



Fig. 6.

In the accompanying cut, fig. 1 will give a fair representation of the mouth of a sheep at this age. Then, with the same previous process of diminution which was described in cattle, or carried to a still greater degree, the two central teeth are shed, and attain their full growth when the sheep is two years old. Fig. 2 gives a delineation of the mouth at this age.

In examining a flock of sheep, however, there will often be very considerable difference in the teeth of the hogs, or the one-shears; in some measure to be accounted for by a difference in the time of lambing, and likewise by the general health and vigour of the animal. There will also be a material difference in different flocks, attributable to the good or bad keep which they have had.

Those fed on good land, or otherwise well kept, will take the start of others that have been half-starved, and renew their teeth some months sooner than these. There are, however, exceptions to this; Mr. Price* says that a Romney Marsh teg was exhibited at the show fair at Ashford, weighing 15 stones†, and the largest ever shown there of that breed, and that had not one of his permanent broad teeth.

There are also irregularities in the times of renewing the teeth, not to be accounted for by either of these circumstances; in fact, not to be accounted for by any known circumstance relating to the breed or the keep of the sheep. The same author remarks, that he has known tups have four broad and permanent teeth, when, according to their age, they ought to have had but two‡. Mr. Culley, in his excellent work on 'Live Stock,' says—"A friend of mine and an eminent breeder, Mr. Charge, of Cleasby, a few years ago showed a shearing-tup at Richmond, in Yorkshire, for the premium given by the Agricultural Society there, which had six broad teeth; in consequence of which the judges rejected his tup, although confessedly the best sheep, because they believed him to be more than a shearing: however, Mr. Charge afterwards proved to their satisfaction that his tup was no more than a shearing§." Mr. Price, on the other hand, states that he "once saw a yearling wether, which became quite fat with only one tooth, that had worked a cavity in the upper jaw, the corresponding central tooth having been accidentally lost."

* Price on Sheep Grazing, &c., p. 84.

† The weights will all be calculated according to the new regulation of 14 lbs. to the stone.

‡ Price on Sheep Grazing, &c., p. 83. § Ib. p. 214.

The want of improvement in sheep which is occasionally observed, and which cannot be accounted for by any deficiency or change of food, may sometimes be justly attributed to the tenderness of the mouth when the permanent teeth are protruding through the gums.

Between two and three years old the two next incisors are shed; and when the sheep is actually three years old the four central teeth are fully grown (see fig. 3): at four years old he has six teeth fully grown (see fig. 4): and at five years old all the teeth are perfectly developed (see fig. 6). This is one year before the horse or the ox can be said to be full-mouthed. The sheep is a much shorter lived animal than the horse, and does not often attain the usual age of the ox.

The careless examiner may sometimes be deceived with regard to the four-year-old mouth. He will see the teeth perfectly developed—no diminutive ones at the sides, and the mouth apparently full; and then, without giving himself the trouble of counting the teeth, he will conclude that the sheep is five years old. A process of displacement, as well as of diminution, has taken place here,—the remaining outside milk-teeth are not only shrunk to less than a fourth part of their original size, but the four-year-old teeth have grown before them and perfectly conceal them, unless the mouth is completely opened. Fig. 5 represents this deceptive appearance.

After the permanent teeth have all appeared and are fully grown, there is no criterion as to the age of the sheep. In most cases the teeth remain sound for one or two years, and then, at uncertain intervals, either on account of the hard work in which they have been employed, or from the natural effect of age, they begin to loosen and fall out; or, by reason of their natural slenderness, they are broken off. When favourite ewes that have been kept for breeding begin, at six or seven years old, to lose condition, their mouths should be carefully examined. If any of the teeth are loose they should be extracted, and a chance given to the animal to show how far, by browsing early and late, she may be able to make up for the diminished number of her incisors. It will not unfrequently happen that ewes with broken teeth, and some with all the incisors gone, will keep pace in condition with the best in the flock; but they must be well taken care of in the winter, and, indeed, nursed to an extent that would scarcely answer the farmer's purpose to adopt as a general rule, in order to prevent them from declining to such a degree as would make it very difficult afterwards to fatten them for the butcher. It may certainly be taken as a general rule that when sheep become broken-mouthed they begin to decline.

It will probably appear, when the subjects of breeding and grazing are discussed, that it will be the most profitable course to fatten the ewes when they are five, or at most, six years old, and supply their places with the most likely shearing-ewes. When a sheep gets much older than this, it begins to decline in its wool, and certainly loses much of its propensity to fatten; while, in the usual system of sheep husbandry, the principal profit consists in early and quick fattening.

Causes of which the farmer is utterly ignorant, or over which he has no control, will sometimes hasten the loss of the teeth. Mr. Price says that the teeth of "the sheep in Romney Marsh decay much sooner than in any other part of England*." Although this is stated with regard to his native and favourite breed of sheep, it is probably an incautious expression, and an accusation which the Romney Marsh flock do not deserve. One thing however is certain, that close feeding, causing additional exercise of the teeth, does wear them down; and that the sheep of the farmers who

* Page 84.

stock unusually and unseasonably hard, lose their teeth much sooner than others do *.

The natural age of sheep it is difficult to assign. They will usually live, and breed, and thrive tolerably well, until they are ten years old ; but there are instances of their living and thriving to a much more protracted age. Lamerville speaks of a Spanish ram, thirteen years old, that died sound and got lambs in his thirteenth year †. Mr. Moore, of Winthorpe, had on his pastures in 1824 a ewe that yeaned a pair of lambs when she was a shearling, had two pairs yearly for fifteen years, and in the last two years produced single lambs ‡. Mr. Culley has "heard of particular sheep living to nearly twenty years old,—those which the mountain shepherds call *guide-sheep*, viz., old wethers kept on purpose to guide and direct the bleating flocks upon those unfrequented wilds §."

The molar teeth or grinders of the sheep are well adapted for lacerating, and reducing almost to a pulp, the grassy or more hardened fibres which compose a great proportion of the food of the animal. They are not only surrounded by enamel, but columns of it sink deep into their substance and rise above the upper surface of them. The faces of these teeth are cut into a number of deep grooves running across them, from without, inwards, and the projecting parts of the teeth of the one jaw are received into the depressed grooves of those of the other.

The faces of the molars being also slanting, in a direction from without, inwards in the lower jaw, and from within, outwards in the upper one, and the projecting edges of the enamel being exceedingly sharp, it is almost impossible that, in the lateral grinding motion of the lower jaw in the act of rumination, and the slow and careful manner in which it is performed, many of the fibres can escape, or if they do, there is an after provision for reducing them, which will, in the proper place, be described.

Chapter II.

The antediluvian Sheep—The Offering of Abel—The Sheep probably not at first used for Food—The First Parents clothed with the Skins of Sheep—Later Improvements on this Species of Clothing—The Origin of the Nomadic Shepherds—The Discovery of Felting—Permitted to be used as Food—The wandering life of the ancient Patriarchs—Their Tents—Great numbers of Sheep and Cattle—The manner of life of the first Shepherds—The importance of Water for their Flocks—The old Wells—The labour of the Female in tending the Sheep and Drawing Water—Jacob and Laban—The first recorded Improvement in Sheep—The Origin of the White Fleece—Gradually spreads over the Western World—The Primitive Breed of Sheep horned—Characterized by Fatness about the Rump—The Fat-rumped Sheep of the present day—The Persian Sheep—Was there any single Original Breed of Sheep?—Ancient Sheep Husbandry—The Duties of the Shepherd—His Sufferings from Drought or Cold—His Danger from Wild Beasts—No Dogs to assist in the Management of the Sheep—His own influence over the Flock—Gives Names to all the Sheep—They know his voice, and follow him—The Origin of the Shepherd's Music—The Humanity of the Shepherd—His care of the Lambs—The plucking of the Wool—The invention of Sheep-shearing—The docility of the Sheep—The Festivities of the Season—Clothing the Sheep—Cotting—Weaving

* Mr. Dillon, in his 'Travels in Spain in 1779,' says that "The teeth of the Spanish rams do not fall until the animal is eight years old ; whereas the ewes, from the delicacy of their frame, or from other causes, lose theirs at five years."

† Lamerville on Sheep, p. 102. ‡ Farmer's Journal, May 3, 1824.

§ Culley on Live Stock, p. 212.

—The state of the Manufacture of Wool—Spinning—Embroidery—The Male only usually destroyed—Animal Food seldom indulged in—The favourite parts—The stalled Ox—The Milk of the Ewe—Its properties—Cheese and Butter made from it—The Cave of Polyphemus—Different processes of making Butter—The use of the Ewe's Milk in other Countries—England—Scotland—France—The Rochfort Cheese.

THE ANTEDILUVIAN SHEEP.

Although there are few traces of the history of the sheep in the antediluvian age, yet mention is made of this animal very shortly after the expulsion of Adam from Paradise. It is said that "In the process of time," or, as it might have been rendered, "at the appointed time," showing that it was a custom which either the Divine command, or the good feeling and the gratitude of the earliest race of men, had established—"Cain brought of the first fruit of the ground an offering unto the Lord; and Abel, he also brought of the firstlings of his flock, and of the fat thereof."

Our first parents having been lately driven from Eden, where the earth spontaneously yielded them its fruits, and where, in a state of innocence, and living in a genial clime, the necessity of clothing was unfelt, Cain and Abel seem to have divided between them the future provision of the family: Abel became "a keeper of sheep, and Cain a tiller of the ground." One purpose for which these sheep were kept is sufficiently plain: instead of the insufficient and fragile covering of the fig-leaf, which they had contrived for themselves, it is recorded that "Unto Adam also and to his wife did the Lord God make coats of skins;" or he taught them to make coats of skins and clothed them.

THE FLESH OF THE SHEEP NOT YET EATEN.

It is probable that the sheep was not then used for food. Ancient history is uniform in asserting, that in the golden or antediluvian age, the use of animal food was unknown*; and the language of Scripture, although not decisive, goes far to warrant the belief that the flesh of animals was not divinely sanctioned as the food of man until after the deluge. When Adam was first "put into the garden of Eden to dress it and to keep it," it is said unto him, "Of every tree of the garden thou mayst freely eat," save one. When he had offended and was expelled from Paradise, this is the sentence—"Cursed is the ground for thy sake. In sorrow shalt thou eat of it all the days of thy life, and thou shalt eat the *herb of the field*; in the sweat of thy face shalt thou eat *bread* †."

The language to Noah after the deluge is very different:—"The fear of you and the dread of you shall be upon every beast of the earth and upon every fowl of the air, upon all that moveth upon the earth, and upon all the fishes; into your hand are they delivered: every moving thing that liveth *shall be meat for you.* Even as the green herb (which was formerly appointed to be your food) have I now given you all things."

THE MILK OF THE SHEEP EARLY USED.

As to the other mode in which the sheep has through every period of ancient history, and, in many countries, even to the present day, contributed to the support of man—namely, by the milk obtained from the fema

* See Ovid's Metamorphoses, lib. i. and xv.

"Not so the golden age—men fed on fruit,
Nor durst with bloody meals their hands pollute."

Josephus, whose history of the Jews, next to that given by the sacred historians, is most to be relied on, says expressly that "Abel brought the *milk* of his flock."

† Gen. iii. 17, 18, 19.

the sacrifice of Abel may convey more information than the reader at first imagines. The Hebrew word, which is here translated "fat," is in other places rendered "milk;" as in Gen. xviii. 8, where Abram is said to have taken butter and milk, and set it before his guests. Let it be thus rendered in the account of this offering—"Abel, he also brought of the firstlings of his flock, even of the milk thereof," or, "he brought the milk belonging to the first-born and best of his flock;" and it will appear that, even in so early a period of the world, the value of the sheep, as contributing both to the food and the clothing of man, was already understood, and that almost to the extent in which it is recognized at the present day by most of the shepherds of the eastern countries.

THE EARLIEST DRESS.

The dress of the first pair was precisely that of the inhabitants of every country in an early period of civilization, or before civilization can scarcely be said to have commenced. The inhabitants of ancient Greece are described as clothed in the skins of the animals which they had either domesticated or killed in hunting *. The Britons, when their island was first visited by Cæsar, were either naked and their bodies fancifully painted, or clad in the skins of animals. Such is still, to a greater or less degree, the clothing of savages every where. At first the skins simply underwent the process of drying, and were then fastened round the neck of the wearer by a simple thorn, or a strip of leather; and they were worn with the wool within or without, accordingly as the weather was cold or hot, wet or dry. By degrees they were fitted to and disposed on various parts of the body, and cut into various forms, or selected of various colours, according to the fancy of the wearer. There was room for the exertion of considerable caprice and ingenuity here.

THE EARLY IMPROVEMENT OF THE SHEEP.

Passing over the admixture, in process of time, of other skins of domesticated or tame animals, and confining the inquiry to those of the sheep alone, the commencement of the improvement of that animal, although perhaps proceeding very slowly, may be easily anticipated and believed. The colour would be an object of some importance. The skin would be valued according to its purity or brightness, or fashion (for early must have been the period of the world when that power had not begun to exert its influence); and an attempt would be made to perpetuate this colour in the flock. Individuals would be selected to breed from with an especial regard to this purpose, and the fundamental principles of breeding would be recognized and acted upon. The size of the skin would sometimes be a material object, and large sheep would be selected. The warmth of the clothing would be a more important affair, and thick and close, or long and shaggy fleeces would be sought after. The unpleasant sensation caused by the contact of coarse wool with the skin would lead to the choice of that of a fine and soft kind. A principle of economy, a desire to make this rude coat last as long as could be effected, would produce attention to the food and to the diseases of the animal, for it would soon be perceived that the adherence of the wool to the pelt was intimately connected with the health of the sheep. Many centuries would not pass without the discovery of

* ——————————"Uti
"Pellibus et spoliis corpus vestire ferarum."—Lucretius, lib. v. 951.
On the eastern coast of Tartary there is a tribe whose clothing is fish-skins, whence they derive their name *Yupi*, which signifies a "fish-skin."—Duhalde's History of China, vol. iv. p. 148.

some means of changing the natural colour of the fleece, and then the art of dyeing would commence. The improvement of the sheep may therefore be considered as having commenced even in these early times, and with this rude kind of clothing; although it would probably proceed slowly enough, and, after all, not be carried to any great extent.

OTHER ANIMALS DOMESTICATED.

The account of the posterity of Cain advances the history of the sheep another and an important step. It is said that "Adah, the wife of Lamech," one of the descendants of Cain, "bare Jabal; he was the father of such as dwell in tents and have cattle *." The reader will observe here the use, for the first time, of the word *cattle*. It frequently occurs in the after-history of the Patriarchs. It is pleasing to connect with a descendant of Cain —Cain the fratricide—and as a proof that the curse did not rest for ever upon his offspring, the first mention of the domestication of other animals, almost as much connected as the sheep with the subsistence and the comfort of man.

THE FIRST WANDERING SHEPHERDS.

Jabal was "the father of such as dwell in tents and have cattle;" or, as it should have been rendered, "Jabal was the father of those who dwell in tents *with* cattle." He commenced that wandering life in order to find pasture for his flocks which their increasing numbers probably now rendered necessary, which was afterwards pursued by Abraham and Isaac, and all the proprietors of numerous flocks in the East, and which the Arab and Tartarian shepherds continue to the present day. *Jabal was the first nomadic shepherd*, about five hundred years before the flood.

THE FLEECE OF THE SHEEP MANUFACTURED INTO THE COVERING OF TENTS.

"Jabal was the father of such as dwell in TENTS." This is another extension of the use of the sheep: he furnished the antediluvians not merely with coverings for their bodies, but also for their moveable habitations. In what way this was managed the only authentic book of early record does not mention. The tents of the ancient shepherds, and even of those of modern times, are described as very differently constructed in different countries and among different tribes. They are spoken of by some authors as consisting of skins sewn together, and by others as made of cloth manufactured by the process of felting. In later times they are said to have been woven, the wool being spun and made into cloth by the wives and daughters of the inhabitants of these tents. Probably these were the three gradations.

FELTING.

The skins of animals, whether domesticated or wild, were rudely sewn together in order to shelter the primitive Asiatic shepherds from the heat of the noonday sun, and from the intense cold of the night, each equally insupportable in that climate. It is, however, scarcely possible to suppose that sixteen hundred years (the interval between the creation and the deluge) could pass without the value and use of the wool, when detached from the pelt, being to a certain degree observed. Its property of matting together, and forming a compact mass on certain parts of the living animal, would be first taken notice of; and when these portions were separated from the fleece, curiosity or accident would discover that this process might

* Gen. iv. 20.

be extended to a greater or less degree by beating, or by pressure, and that the wool would form a soft and pliable and warm substance, evidently fitted for human clothing, and far more comfortable, and more easily applicable to the wants of the individual and of society, than the skins that had been previously used. The felting property of wool would thus be developed; and that rude species of manufacture, by means of which the fleece used to be converted into cloth, and is still so in some of the less civilized portions of society, would be invented and improved to a very considerable degree.

THE FLESH OF THE SHEEP USED AS FOOD.

For nearly twelve hundred years longer, the early history of the Sheep can be traced in the Scriptures alone. The first passage that throws light upon it is the permission to use the flesh of animals as food, and which has already been hinted at. "Every moving thing that liveth shall be meat for you; even as the green herb," as I formerly gave you the green herb, "have I" now "given you all things*."

It does not, however, appear that, for a considerable period, full advantage was taken of this permission. The flesh of animals seems to have been first eaten at the periodical sacrifices that were offered to the Giver of all things. After that, animal food was considered as an occasional luxury, and as an indulgence not to be justified except on some particular occasions†. It was long before the generality of persons could be brought to feed on the animals that they had domesticated,—that they had been in the habit of daily seeing and tending, and from which they had derived so much advantage‡. The old custom of living on vegetables alone is retained in some parts of the East to the present day, and is considered by certain Indian castes as a religious duty.

The animal which is the subject of the present history never seems to have been generally used for human food. Many of the wandering tribes preferred the flesh of the horse and of the camel to that of the sheep§; and even at this day the latter is comparatively disliked in Spain ‖—a prejudice exists against it in America—in no country does it appear to have been so universally adopted and so much relished as in Great Britain, and even there, it will hereafter be seen, that the liking is but of recent growth.

The following passage is found in Pliny (Secundus)¶, and is thus translated by old Philemon Holland:—"Sheepe likewise are in great request

* Gen. ix. 3.

† Wilson's Archæologia *in loc.*

‡ Many more than a thousand years after this, the following opinions were prevalent, and almost assumed the authority of laws, among the most civilized and luxurious people of the world. "No one was to kill an ox which laboured at the plough," (Ælian Var. Hist. lib. v. c. 14). "No one was to kill a lamb or an ox under one year old," (Athenæus, lib. i. and ix.; Eustathius in Iliad, &c.). And, honourable to the age and the country, "No one was to hurt any living creature," (Porphyr. de Abstinen.; Hieronim. in Jovin. lib. ii.) The use of animal food was slowly and never universally established.—See also Robinson's Archæologia Græca, pp. 118 and 496.

§ In an account of the Calmucs and Cossacs, drawn up by M. Polignac at the command of the reigning monarch in 1750, it is said of them,—"The usual food of these Tartars is horse-flesh. Bread and mutton are reserved for the rich and wealthy burghers that live in their towns without ever taking the field. Their clothing is sheep-skins. In winter they wear the wool next to them; but in summer, or when it rains, they have the wool on the outside."

‖ Dr. Parry, the earliest and the latest advocate of the Merinos, acknowledges that the carcass of the sheep "is an object of little or no value in Spain, and that, except with the poorest people, it is not considered fit for food."

¶ Lib. viii. c. 47.

both in regard they serve as sacrifices to appease the Gods, and also by reason of their fleece yielding so profitable a use: for even as men are beholden to the bœufe for their principal food and nourishment which they labour for, so they must acknowledge that they have their clothing and coverture for their bodies from the poore sheepe."

A quotation from an old English poet shall close this account of the use of the sheep as food:—

> "Poore beast that for defense of man at first created wast,
> And in thy swelling udder bearst the iuyce of dainty tast;
> That with thy fleece keeps off the cold that would our limbs assaille,
> And rather with thy lyfe than with thy death doest us availe."

It is somewhat singular that notwithstanding this seeming prejudice against the flesh of the sheep, all writers on diet have agreed in describing it as the most valuable of the articles of animal food. Pork may be more stimulating; beef, perhaps, more nutritious when the digestive powers are strong: but, while there is in mutton sufficient nutriment, there is also that degree of consistency and readiness of assimilation which renders it most congenial to the human stomach, most easy of digestion, and most contributable to health. The flesh of the ram is tough—it has an unpleasant flavour, and is scarcely eatable; the meat of the ewe, and especially if she is not cast until she is old, may be somewhat hard and deficient in juice, but a wether in his prime according to the breed, whether the present improved one that rarely lives beyond his second year, or a native of the heaths or the hills that does not arrive at perfection until he is four or five years old, will afford a species of food unequalled in its grateful taste and genuine wholesomeness. Of it almost alone can it be said, that it is our food in sickness as well as in health; its broth is the first thing that the invalid is permitted to taste, the first thing that he relishes, and is his natural preparation for a return to his common aliment*.

Although nothing can yet be asserted of the form and qualities of the primitive sheep, yet it is plain that from the moment of its being used for food its more rapid improvement must have commenced. If cultivated only for the wool, there would almost necessarily be that want of beauty and compactness, and profitableness of form, which in the case of the Merinos proved an insurmountable objection to the introduction, into a thickly populated country, of a sheep possessing the finest and the heaviest fleece, but failing in the production of animal food. If, on the other hand, the carcass occupied the whole of the attention of the shepherd, the wool would rapidly degenerate and become comparatively worthless. It is when the farmer has due regard to both of these essential properties of the sheep, that that animal can reach the degree of improvement of which nature has made it capable, and to which on British pastures it has arrived.

Lord Somerville has placed this in its proper point of view when he says that "sheep are bountiful animals to man, for, let us blunder as we will, they feed us, clothe us, and can hardly, under any bad management, be kept with loss:" and he adds, that "the breed of sheep, which on any given quantity of land will carry for a continuance the most wool as well as flesh, and both of the highest quality, is the breed to be preferred, or which has arrived nearest to perfection."

DESCRIPTION OF THE ANCIENT PATRIARCHS.

Two hundred and sixty years now pass over before the mention of any thing occurs that has reference to the present inquiry; it is then (1921

* Brewster's Encyclopædia, art. ALIMENTS.

B.C.) recorded that Abram and Lot came from Ur of the Chaldees, and Abram pitched his tent on "a mountain on the east of Bethel*." Thence he journeyed into Egypt, and he is said to have had "sheep and oxen, and men servants and maid servants, and asses and camels†." Returning towards Palestine he is described as being "very rich in cattle, in silver, and in gold; and Lot also which went with Abram had flocks, and herds, and tents, and the land was not able to bear them that they might dwell together‡,"—there was not sufficient pasture for the numerous flocks of both; whence arose "strife between the herdmen of Abram's cattle and the herdmen of Lot's cattle§," and these relatives and friends separated from each other, Lot journeying towards Sodom, and Abram taking his course towards Canaan. After this Abram removed to the plain of Mamre, and there learning that his brother Lot had been attacked and made prisoner by some of the chieftains of that country, "he armed his trained servants," trained for war, "born in his own house, three hundred and eighteen, and pursued" the spoilers and smote them, and rescued his brother and all his property ||.

THE PEREGRINATIONS OF THE ARABS.

These passages, written more than 3700 years ago, and which will be considered separately, present a singularly correct picture of the present mode of life of the Arabian and Tartar shepherds. Abraham and Lot are living in tents. The Chevalier d'Arvieux, who published an account of his travels in the East in the early part of the last century, and the fidelity of whose narrative has never been disputed, thus describes the Arabian shepherds:—"These Arabs have no other lodging but their tents, which they call houses; they are all black, of goat's-hair canvass, and are stretched out in such a manner that the rain easily runs off without ever going through them. Their whole families, and all that they have in the world, even to the stables, are there, particularly in the winter. The tent of the Emir is of the same stuff, and differs only from those of his subjects in bigness."

Abram pitched his tent on a mountain. D'Arvieux says that "the Arabs commonly encamp on the top of some little hills, where there are no trees to hinder them from discovering a great way off all that come and go, that they may not be surprised, having nothing else to fear."

Abram is described by the sacred history as shifting his residence from place to place. D'Arvieux says that "the Arabs set themselves down wherever they find springs of water, or rivulets in the valleys, and pasture for the subsistence of their cattle, and then decamp, as soon as that is gone, and go and post themselves in another place every fortnight, or at most every month. They live all the summer upon these hills, always advancing towards the north; and when winter begins to come in, they go by degrees towards the south, as far as Cæsarea of Palestine, and on the outside of the mountains of Carmel."

A traveller thus describes the march of the modern Arabs:—"Their wandering life, without ambition, brings to the mind of the traveller that of the ancient patriarchs. Nothing is more interesting than their manner of changing their abode. Numerous flocks, which precede the caravan, express, by their bleating, their joy at returning to their former pastures. Some beasts of burden, guided by the young men, bear the little ones just dropped and not able to travel. Then come the camels, carrying the baggage

* Gen. xii. 8. † Gen. xii. 16. ‡ Gen. xiii. 2, 5, 6.
§ Gen. xiii. 7. || Gen. xiv. 14, 16.

and the old and sick women. The rest go on foot, carrying their infants at their backs or in their arms; and the men, mounted on their horses, armed with lances, ride around and bring up the march of the cattle which loiter behind, browsing as they slowly move on. In this manner they journey, and find their homes, their hearths, and their country in every place*."

> The weary Arabs roam from plain to plain,
> Guiding the languid herd in quest of food,
> And shift their little home's uncertain scene,
> With frequent farewell: strangers, pilgrims all,
> As were their fathers†.

NUMEROUS FLOCKS.

The sacred history goes on to state that "the flocks and herds of Abraham and Lot were so great that the land was not able to bear them." There was not sufficient pasture for the support of their united flocks. The Scriptures often speak of the immense flocks of sheep with which Palestine abounded. Job had 14,000 sheep, besides oxen and camels. The sheep always constituted by far the most numerous part of the shepherd's possessions. When 12,000 of the Israelites made an incursion into Midian, they brought away, besides other spoils, three score and twelve thousand beeves, and 675,000 sheep ‡. When the tribes of Reuben and Gad made war with the Hagarites, they obtained as a booty 250,000 sheep §. The king of Moab rendered a yearly tribute of 200,000 sheep; and Solomon offered 120,000 sheep at the dedication of the Temple ‖.

There are many circumstances which will readily account for these numerous flocks of sheep. They were the chief possession,—the almost only riches of the people: comparatively few of them were destroyed, for their flesh was rarely eaten, except on solemn sacrifices, or occasions of peculiar rejoicing; and there is reason to believe that the ewes had lambs twice in the year. The Jewish writers frequently speak of the first and second yeanings, referring the former to the month Nisan, corresponding to the March of the modern calendar; and the other to the month Tissi, answering to September. The lambs of the two seasons were distinguished

* "After this horde I met with a smaller party, consisting of about a dozen families: they were approaching a beautiful little hollow, surrounded on three sides by hills, and which they seemed to have chosen as the place of their encampment. The sheik was the only one of the whole who rode. The rest of the men walked, as did most of the women. The boys drove the flocks of sheep and goats, and the little children the young lambs; the kids and the poultry were carried in panniers or baskets across the camels' backs. The tents, the cooking utensils, and the provisions and furniture were likewise laden upon these useful animals. As the camels halted every minute to pull a handful of leaves from the bushes, the progress of their march was very slow; but the patience of all seemed quite in harmony with the tardy movement of the camels, and it was evidently a matter of indifference to every one of the group whether they halted at noon or at sunset, for an hour was time enough to prepare their shelter for the night." —Buckingham's Travels in Palestine, p. 324.

"It was entertaining enough to see the horde of Arabs decamp. First went the sheep and goats in regular divisions, then followed the camels and asses, loaded with the tents, furniture, and kitchen utensils. These were followed by the old men and the women, and the boys and girls on foot. The children that could not walk were carried on the backs of the young women, and the boys and girls; and the smallest of the lambs and kids were carried under the arms of the children. The procession was closed by the chief of the tribe mounted on the very best horse, and surrounded by the heads of each family all on horses, with many servants on foot."—Parson's Travels from Aleppo to Bagdad, p. 109.

† Dyer's "Fleece," Book I.

‡ Numbers xxxi. 32, 33. § II. Chron. vii. 5. ‖ I. Chron. v. 21.

by different names descriptive of their supposed qualities: the first were called *keshorim*, or *bound*, on account of their stronger-built or more compact frame; the second *œtophim*, or *deficient*, because they were feebler and of comparatively less value*.

These numerous flocks, however, were not confined to ancient times. Sir John Chardin had the opportunity of seeing a clan of Turcoman shepherds in their march about two days' distance from Aleppo. There were 400,000 beasts of carriage,—as camels, horses, oxen, cows, and asses; and there were more than 3,000,000 of sheep and goats. Dr. Shaw states that several Arabian tribes who can bring no more than 300 or 400 horses into the field, are possessed of more than as many thousand camels and oxen, and treble the number of sheep and goats †.

HOSPITALITY.

A circumstance, apparently trivial, is soon after recorded, and only mentioned as showing the minute accuracy with which the historian has depicted this primitive shepherd. "As he sat in the tent door in the heat of the day, he saw three strangers approaching ‡." The following passage is a sufficient comment. It was the hottest part of the day of which the traveller speaks. "We had in view several fine bays, and a plain full of booths, with the Turcomans sitting by the doors under sheds resembling porticoes, or made by shady trees, surrounded by flocks of goats §." To entertain these travellers, Abram "took butter and milk, and the calf which he had dressed ‖," and set it before them. It is merely observed at present, that this is the first time that any particular kind of animal food is spoken of; and that the word translated *butter* is sometimes rendered *fat*, and, more frequently, *cheese*. The manufacture of cheese was indicated by the natural curdling of the milk,—and the mention of it occurs in profane history many centuries before butter was known, or at least spoken of. Both of them were composed principally, or almost entirely, of ewes' and goats' milk, mixed together except a small quantity, used only as a delicacy, and made from the milk of kine. It will hereafter be shown from other passages, that the milk which was presented to the strangers was ewes' milk; and which, in later times, was changed for that of camels ¶.

* There are several passages of Scripture which lead to the supposition that the Eastern sheep often produced two, and sometimes more than two lambs at a birth.—Ps. cxliv. 13; Solomon's Song, iv. 2. Sir Thomas Browne observes, in his Miscellaneous Tracts, "that the sheep of Palestine must not be judged of by ours, for they were abundantly more prolific." Bochart has proved this fact, vol. ii. p. 432, 510. See also Burder's Oriental Literature, vol. ii. p. 56.

† Shaw's Travels, ii. p. 125.

‡ Gen. xviii. 1, 2.

§ Chandler's Travels in Asia Minor, p. 180.

‖ Gen. xviii. 8.

¶ Burckhardt affords an excellent commentary on this. "*Ayesh* (flour and sour camel's milk) is the usual and universal dish with the Aeneses, and even the richest sheik would think it a shame for his wife to dress any other dish merely to please his own palate. For a common guest bread is boiled and served up with the ayesh; but for a guest of rank a kid or a lamb is killed. They boil it with *bourgal* (wheat boiled in some leaven and then dried in the sun) and serve it in a wooden dish, round the edges of which the meat is arranged. A wooden bowl containing the melted grease of the animal (often called butter, or camel's grease, and which is kept in goat skins, and used as butter) is pressed down in the midst of the bourgal, and every morsel is dipped into the grease before it is swallowed."—Page 35.

Buckingham also, in his 'Notes on Palestine,' well illustrates the conduct of Abram to these strangers. "A poor man, if he is hospitable, always kills a lamb when a stranger arrives, gives coffee to all the guests present, holds his bag of tobacco always ready to supply the pipes of his friends, and sacrifices his last penny to honour his guest,

WELLS.

In the deserts of Arabia, and even in the plains of Judea, water was essential, not only to the comfort and thriving of the flock, but to its very existence; and one of the most important duties of the shepherd was to enable the sheep occasionally to quench their thirst. It was rare that the flowing stream was met with in these sandy regions; natural pools of water were almost as unfrequent, and a drought of no long duration would cause them to disappear *. To prevent disappointments of this kind, the shepherds, with immense labour, dug wells at their usual resting-places, and at other spots in the intermediate distance;

> "The ancient wells, deep sunk with toil immense,
> Toil of the Patriarchs, with sublime intent,
> Themselves and long posterity to serve †."

These, however, in process of time, decayed, or were choked with sand, or they were wilfully filled by a vindictive enemy; or the struggle to procure water from them, between the herdsmen belonging to different masters, was productive of quarrels and bloodshed. To prevent these evils, certain usages were gradually established, and acknowledged and respected by all the neighbouring herdsmen, except those who were perfectly lawless.

It was because Abraham had suffered from some of these inconveniences, and particularly the petty warfare which existed between his herdsmen and those of Abimelech, king of the Philistines, that the following transaction took place. Abraham, after presenting Abimelech with some sheep and oxen, in token of the cessation of their quarrel, "set seven ewe-lambs of the flock by themselves. And Abimelech said unto Abraham, What mean these seven ewe-lambs which thou hast set by themselves? And he said, For these seven ewe-lambs shalt thou take of my hand, that they may be a witness unto me that I have digged this well ‡."

Abraham effected a regular and freehold purchase of the well and the ground in which it was dug at the price of these seven ewe-lambs. They were *the money* which he paid for this spot of ground; or "they were that commodity of known value and general demand which stood in the stead of money," proving how universally they had spread, and how generally their value was acknowledged §.

or relieve those who want. In his common living the richest sheik does not differ from the meanest of his tribe. They eat every day of the same dish, and never partake of any luxury, except on the arrival of a stranger, when the tent of the host is open to all his friends."—Page 41.

* M. de Brisson, in the History of his Captivity among the Arabs, describes the drought which occasionally prevails. "The end of the year was now approaching, and a single drop of rain had not yet fallen. The plains and the valleys were entirely burnt up; nothing remained for the nourishment of the flocks, and the month of December had arrived, when the rains generally ceased until the next October. The desolation was universal, when an Arab from a distant part of the country came to inform us that abundant showers had refreshed the earth in some remote districts. Upon the news, joy succeeded to fear and grief—every one struck his tent, and set out for the regions that had been lately watered."—p. 37.

Even in the more temperate clime of Britain, sheep have often severely suffered from want of water. The summer of 1803 was unusually sultry and dry. "A flock of sheep at Pevensey, consisting of 300, being driven to a pond, after long thirst, drank so immoderately that more than a hundred of them died."—Annual Register, 1803.

† Dyer's Fleece, Book I.

‡ Gen. xxi. 27—31.

§ "Wealth used to be estimated by the number and quality of the cattle. They were the principal instruments of commerce. Thus we read in Homer of a cauldron being worth twenty sheep, and a goblet worth twelve lambs, &c. These animals were the means by which exchange or commerce was originally carried on. The proof of this is convincing enough, as well as very singular. The word which signifies the exchange of

JACOB AND LABAN.

A hundred years elapse before the scriptural history of the sheep is resumed. Jacob had escaped from the justly merited anger of his brother Esau, and had travelled eastward until he arrived at Haran*, where his uncle Laban had at that time pitched his tents. As he halted by a covered well, Rachel, the younger daughter of Laban, came to water her father's sheep. She is the first shepherdess of whom mention is made in ancient history, and her name, which signified a sheep, was characteristic of her occupation.

THE FLOCKS TENDED BY WOMEN.

This meeting of the cousins presents another picture of these early times. Rachel, the daughter of a man of some substance in that part of the country, tends her father's flock †; and Jacob, the son of a shepherd-prince, rolls away the stone from the well, and afterwards becomes servant to her father for her sake. It is precisely in keeping with the accounts of profane authors some centuries afterwards, when the daughters of nobles and princes are represented as employed at home in weaving garments for the family, or looking after the flocks abroad, and feeding the horses, and fetching water from the fountains.

THE FIRST GREAT IMPROVEMENT OF THE SHEEP.

"Jacob served Laban seven years for the sake of Rachel, and they seemed to him but a few days, for the love he had to her;" and then, being deceived by her father, he served for her yet another seven long years: at the expiration of that time, Laban offering him no wages, he was naturally anxious to return to his father. Laban, however, who was conscious that much of the prosperity that had lately attended him was attributable to the skilful and faithful service of his son-in-law, entreated him to remain, and Jacob consented on certain strange conditions. The wording of the common translation is not a little obscure ‡; but the meaning, as understood by the parties, was this: that in future, the speckled or ring-streaked sheep and goats—exceptions to the general colour, a brown or dingy black—the sportings rather than the regular productions of nature—should be considered as the wages of Jacob. These could hitherto have been very few, or the selfish and avaricious father-in-law would not have consented to the

* one kind of goods for another is derived from the Greek word for a *lamb*, ἀρνεσσαι, from ἀρνες. A wealthy person is called 'a man of many lambs,' and two rival brothers are represented by Hesiod as fighting about the 'sheep,' that is, the property of their father."—Hunter's Sacred Biography, *Abraham*.

* Gen. xxix. 1.

† In the descriptions already given of the marches of the horde, they have been seen toiling on foot with their children at their backs, and the younger girls taking the principal share in carrying the infants or the lambs. Burckhardt shall illustrate their employment when the tribe has arrived at its resting-place: "Among the Arabs of Sinai it is an established rule that neither the men nor the boys should ever drive the cattle to the pasture. A boy would feel insulted if any one were to say, 'Go and drive your father's sheep to pasture;' these words would in his opinion signify, 'You are no better than a girl.' This is the exclusive duty of the unmarried girls of the camp, who perform it by turns. Thus early accustomed to such fatiguing duties, the Sinai women are as hardy as the men. I have seen these females roaming bare-footed over sharp rocks, where I, well shod, could with difficulty step along. During the whole day they continue exposed to the sun, carefully watching the sheep, for they are sure to be severely beaten by their father should any be lost."—Notes on the Bedouins. Their brothers or their fathers had indeed the grace to relieve them from their post when the day was passed, and the wild beasts of those uncultivated regions began to be in motion.

‡ Gen. xxx. 32.

proposal. The bargain was struck, and all the parti-coloured cattle were separated from the rest, and driven away to a distance of three days' journey, and put under the care of Laban's sons, so that there could be no imposition or dishonesty; and the sheep of a uniform colour were left with Jacob.

He had probably witnessed the power of imagination at the moment of the female's conception, and had thought that he might turn this, and not dishonestly, to his advantage, for the compact between them was sufficiently plain: "Jacob therefore took him rods of green poplar, and of the hazel and chestnut-tree, and pilled white strakes in them, and made the white appear which was in the rods, and he set the rods which he had pilled before the flocks in the gutters in the watering-troughs, when" (at the time of the unrolling of the stone, a work of labour, and therefore done as seldom as possible) "all the flocks, male and female, came to drink *;" and they generally coupled before the watering-troughs, and with these straked and pilled rods before them. When by these means some speckled or ring-straked lambs had dropped, he placed them in the sight of the other ewes—"he set the faces of the flocks towards the ring-straked," in order that they might produce the like.

It was only when the stronger sheep, those of the first yeaning, were in season, that he resorted to this expedient; the autumnal and weaker cattle were suffered to take their course. The consequence was, that either from the power of imagination in the mother, carried to an extent the like of which is certainly not seen at the present day, or from some superior over-ruling agency, the flock generally "brought forth cattle, ring-straked, speckled, and spotted." The whole story would induce the belief that some superior power aided the ingenuity of the servant, and rewarded his fourteen years' fidelity to an ungenerous and avaricious master †.

Laban was, as might be expected, very much dissatisfied, and altered, unjustly altered, the wages of his servant. He limited this change of colour to one kind alone. First he said that the speckled only should belong to Jacob. Perhaps he might have seen or heard of the pilled rods, and imagined that he should thus thwart the stratagem of his servant; but either speckled rods were substituted for those that had been pilled in the form of rings, or this superior agency continued to influence the breeding of the cattle—the lambs were all speckled. Again he affirmed that the bargain extended to the ring-straked alone, and the lambs then were dropped ring-straked; and so in process of time "the cattle were taken away from Laban and given to him, and the man increased exceedingly, and had much cattle, and maid-servants, and man-servants, and camels and asses ‡." During the whole transaction, although Jacob did not immediately separate the parti-coloured lambs from their mothers, for a reason that has just been hinted at, yet he continued to breed from those of one uniform colour.

THE PROGRESS OF THE IMPROVEMENT.

This is the first intelligence which the Scriptures afford of the kind of sheep in these early times, or at least of those of which these flocks were composed: they were of one uniform colour, brown or dingy black, and the exceptions

* Gen. xxx. 37, 38.

† Michaelis observes on this passage, that "even in later times a similar method is adopted in order to obtain a similar result, something white being placed in the water-troughs before the sheep, or white cloths hung up in the fold; and even the water-troughs have been made of perfectly white stone, in order that white lambs might be produced." —*In loc.*

‡ Gen. xxxi. 8, 9, and xxx. 43.

were accidental and few in number. From the experiment or policy of Jacob, sheep of a new colour arose: they formed his numerous flock when he quitted the service of Laban; some of them afterwards mingled with the herds of Esau; they were probably continued among the descendants of Jacob, and the better appearance of the fleece, and the more varied and useful purposes to which it might be devoted, would lead to a selection from those that had the most white about them, until at length the fleece was purely white. It had become so in the time of David, who likens it to snow*; and Solomon speaks of the teeth of his mistress, as resembling a flock of sheep just come up from the washing†.

Mr. Luccock, whose researches into everything connected with wool are exceedingly valuable, clearly traces the present colour of the fleece to these proceedings of Jacob. He says that "this new variety of flocks soon established itself in the country where it was produced, and gradually diffused itself southward as far as the desert of Arabia, so that in the space of 300 (600) years its whiteness had become proverbial‡."

Some of the best principles of breeding must have been steadily and long pursued before this could have been effected; and probably in this, as in many other particulars, the ancients have not been far exceeded by the moderns in scientific and useful pursuits.

In the desert, where the numbers of the inhabitants were fewer, and their association with each other less frequent, the change was more slowly effected, or rather, has not been perfectly accomplished at the present day. The Arabs are true to the customs and prejudices of their ancestors more than 2000 years ago.

Mr. Luccock states, that "this alteration in the colour of wool evidently took the line of the richest soils, and spread its influence more readily through countries where the arts of husbandry had made the greatest progress, and but seldom passed their boundaries. From Persia, descending the Euphrates, and passing over the richer countries of Syria, it reached the borders of the Nile §." In this direction we are enabled satisfactorily to trace it, when, some centuries afterwards, the records of general history are joined to those of the Scriptures.

Northward, too, it began to spread; it ascended on either bank of the Euphrates, until it arrived at those of the Phasis, and diffused itself over the fertile country that lay at the feet of the mountains of Colchis, now Mingrelia and Georgia. There it seems peculiarly to have established itself, and, more than five centuries afterwards, its reputation had reached Greece. The leading men of the infant states of Greece united together, and, under some false or frivolous pretext, invaded Colchis, defeated and slew its king, and carried away the Golden Fleece. This was a prize not valuable, as some have feigned, on account of the particles of gold which, brought down by the torrents from Mount Caucasus towards the banks of the Euxine, were collected in the fleeces of sheep that were sunk in the streams in order to receive them ‖, but from its own intrinsic excellence; and it has ever been, and will continue to be, a mine of gold to every country in which it is found, and its worth duly estimated.

The foundation of the splendour of the Grecian republics was laid by the celebrated Argonautic expedition; and in the course of this treatise, the progress and the beneficial results of the breeding of sheep and the manufacture of wool will be traced through many a country in the eastern

* Psalm cxlvii. 16. † Solomon's Song, iv. 2. ‡ Essay on Wool, p. 30.

§ Ib. p. 31.

‖ Strabo, lib. xii. p. 199. Appian says, that Pompey, after the defeat of Mithridates, was an eye-witness of this fact.

and western worlds. In the meantime the memory of Jacob will be respected, not only from its connexion with sacred story, but because he was the first recorded improver of the sheep, and his improvement has survived the wreck of ages, and will never be surpassed. The superior cheerfulness which sheep and goats with white fleeces communicated to rural scenery, the cleanliness which wool of that description was calculated to promote when used as an article of furniture or of dress, and, above all, the greater variety and vividness of the artificial tints with which it might be imbued, conspired from the beginning, to render it more valuable, and, in every age, more sedulously cultivated than that of a dark or black hue.

Nature, however, although controlled, cannot be perfectly subdued. In some justly esteemed breeds of sheep we see traces of their original descent. Although, on the southern downs, that which was most valuable in the improvement of colour is retained, yet the muzzle and the legs betray the character of the early progenitors. In the Norfolks this is more decidedly seen; and now and then a perfectly black sheep betrays, in a manner not to be mistaken, the native hue, and the still lurking primitive tendency. Even where the fleece has, by diligent cultivation, been brought to the purest white, a dusky or a black lamb will occasionally display the colour, if not the other lineaments of the first parents.

The master and the servant, the father and the son-in-law, could not long remain together while the prosperity of the one was daily increasing, and the sources of wealth proportionably diminishing with the other; and accordingly it is said, that "Jacob beheld the countenance of Laban, and behold, it was not toward him as before:" and fearing, from the character of the man, and the too frequent practices of the times, that treachery or violence would soon be resorted to, he took advantage of Laban's absence, and fled towards his native land. The news was quickly conveyed to the father-in-law, who pursued the fugitive, and overtook him before he could reach the tents of Isaac. The explanation which took place throws still further light on the management of the sheep in those days.

After this the Bible contains only incidental mention of the sheep, its produce, and the treatment to which it was subjected. Patches of information scattered in various parts of the volume must be compared together, in order to obtain any satisfactory notion of the true character of the husbandry of the times. It will therefore be advantageous no longer to follow precisely the order of events, but to bring into one point of view the information which the Scriptures afford, connecting with this the few gleanings that can be collected from profane history, the earliest authentic records of which do not, however, commence until many centuries after the time of Jacob.

THE ORIGINAL BREED HORNED.

The primitive breed was certainly *horned*, and those horns were of considerable size. When Abraham, in obedience to the Divine command, was about to sacrifice his son Isaac, his arm was arrested by a voice from heaven, "and he lifted up his eyes and looked, and behold, behind him a ram caught in a thicket by his horns *." The trumpets used in war were made of rams' horns †. The polled sheep were probably an accidental variety; and when first occurring, cultivated partly for their singularity, and more for their utility, whether with reference to the additional closeness of folding of which they were capable, or the fewer accidents that were likely to occur, or, most of all, from the superior docility and quietness of those

* Gen. xxii. 13. † Joshua vi. 6.

to whom nature had not given these weapons of offence, and of the use of which all animals soon become too conscious. There is not, however, a polled breed of the present day in which lambs are not occasionally dropped with the rudiments of horns: some of these horns grow to their full size, and others are curiously attached to the skin alone, and either hang loosely down, or drop off.

THE ORIGINAL BREED.

From very early times two breeds of sheep have inhabited the countries over which the patriarchal shepherds roamed, and have spread themselves through the neighbouring districts. One has, as its principal characteristic, a lengthened tail, with an accumulation of fat around the superior part of it. These sheep have been found in Arabia and Syria, but most numerous in the interior, and in the southern part of Africa; and constituting the only native breed of these latter regions. The others have an accumulation of fat commencing at the posterior part of the loins, swelling gradually into a considerable mass towards the rump, and presenting behind two enlargements of a more or less globular form. This kind of sheep is scarcely known in Africa, but it covers both the north and the south of Asia; it prevails far more than the other in Palestine; it reaches even to the interior, and the northern part of Russia; and it is the kind of sheep of which the flocks of the Kalmucks and the Turcomans, and indeed of almost all the wandering hordes of shepherds are, to the present day, composed.



[*Fat-rumped Sheep.*]

* The reader is here presented with a cut of it as it exists at the present day in the north-eastern part of Europe, through the whole of the temperate regions of Asia, and to a greater or less degree from the Baltic Sea to the North Pacific Ocean *. It is purest in the deserts of Great Tartary, and influenced in its form only by pasturage, soil, and climate; no other variety being near to contaminate its blood. The following is Dr. Anderson's account of this breed; not so precise, indeed, as could be wished, but sufficiently satisfactory.

* See Pallas's Travels in Russia, and particularly Anderson on the Russian Sheep, p. 26.

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"The flocks of all the Tartar hordes resemble one another, having a large yellowish muzzle, the under jaw often projecting beyond the upper; by long hanging ears, and by the horns of the adult ram being large, spiral, wrinkled, angular, or bent in a lunar form. They have slender legs in proportion to their bodies, a high chest, large hanging testicles, and tolerably fine wool mixed with hair. The body of the ram, and sometimes of the ewe, swells gradually with fat towards the posteriors, where a solid mass of fat is formed on the rump, and falls over the anus in place of a tail, divided into two hemispheres, which take the form of the hips, with a little button of a tail in the middle to be felt with the finger."

The admirers of some of the improved breeds of sheep will find great fault with the large and heavy head; the comparatively thin neck, and especially at the base, where it proceeds from the chest; the depth and want of substance from the withers to the elbow; the deficiency of brisket, its place being supplied by a kind of dewlap; the want of depth immediately behind the elbow; the tendency to belly posteriorly; the length of the legs; the gauntness and muscularity compared with the roundness and compactness of some modern breeds: but it cannot be denied, that, considering it as belonging to the wandering shepherds, as traversing a vast extent of country, and subject to want and to drought, and to the vicissitudes of the seasons, it is not badly adapted to the situation in which it is found, and there are evident capabilities of improvement, when chance, or the progress of civilization, may give opportunity for its development.

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THE PRESENT TARTARIAN SHEEP.

The flocks of all the Tartar hordes have much resemblance to each other: but climate, soil, &c., produce some small difference in them, whether reared by the Tartars, or by the Russians, in the western deserts of Great Tartary, from the river Volga to the Irtish and the Altaic chain of mountains. In all that tract of country the pasturage abounds with acrid and liliacious plants in spring; while in summer, at least in the open spots where sheep delight to feed, beside the common grasses, bitter and aromatic plants, wormwood, camphorosna, and many species of salt-wort abounding in juices and salts are also found.

These sheep, liberally fed at first with the mother's milk, and afterwards traversing a rapid succession of saline and abundant pasture, attain a very considerable size. They often weigh more than 200 lbs., and may be considered as the largest of the unimproved sheep; of which weight the soft oily fat alone that forms on the rump amounts to from 20 to 40 lbs. * The *Uropygium*, or fat rump, which is made up of this oily species of fat, is so large as to incommode the animal in walking; but when the same sheep are carried into the interior parts of Russia, the tail loses half its size and weight, nay sometimes more than that, from a change in their food and mode of life †.

On the banks of the Volga below Lamara these saline pastures are

* The following is a description of one of these *Steatopyga*, or fat-rumped Kirguise rams, and that not of the largest size:—"*Head* rather less than many others of the same variety, and all black, even to the horns. *Ears* pendent and black, except the outer rim, which was spotted with white, as were the legs. *Throat* covered with greyish hair, the rest of the animal white. *Horns* spiral. *Uropygium* (fat-rump) very large, and divided into two hemispheres. *Anus* filled with fat, or rather stuffed with it in all parts. *Scrotum* covered with hair. *Prepuce* large. *Wool* coarse, and some inches long on the back, sides, and extremities; while it is mixed every where with hair.

"Total weight of the ram before cut up or skinned, 193 lbs.; the fat of the uropygium and anus 38 lbs."—Anderson, p. 31.

† Anderson, p. 31.

wanting: the snow likewise lies deep during the greater part of the winter, often causing a destructive scarcity of food among those who make no provision for a future day. The same kind of sheep prevail there; but they are diminished in size, and the fat rump is more than proportionably lessened, and even the horns are frequently wanting. On the Janisey they are considerably less. In other parts of these Tartarian regions, where the pasture is abundant but there is no saline impregnation, sheep of a size occasionally exceeding that of the Kirguise are found; but the excrescence on the rump is much smaller, and rarely greater than that which is found on the corresponding parts of some of the improved British breeds when fatted to excess.

A very intelligent writer gives a similar description of the Kerguise, or Kerguise and Kalmuckian sheep. In the mountainous districts "they are higher than a new-born calf, and so strong and heavy that the full grown ones weigh between four and five poods. In shape they resemble the Indian sheep. They have the arched front of the old battering-ram, prominent under lips and large pendulous ears. Instead of a tail, they have a monstrous round of fat like a cushion, weighing 30 or 40 lbs., and yielding between 20 and 30 lbs. of tallow. Their wool is coarse, entangled together, and strongly mixed with hair. The rams are universally, and the wethers generally, horned; and some, like the Icelandic, have four, five, or six horns. During the whole winter they seek their fodder under the snow, without losing their condition by it. To this the shortness of the season much contributes, as well as the circumstance that the snow passes away more rapidly on the salt parts of the steeps; and all animals are fattened by feeding on the vegetables of a saline soil.

"So rich is the country with sheep, that common Tartars often possess a thousand, and some of the richer ones more than fifty thousand.

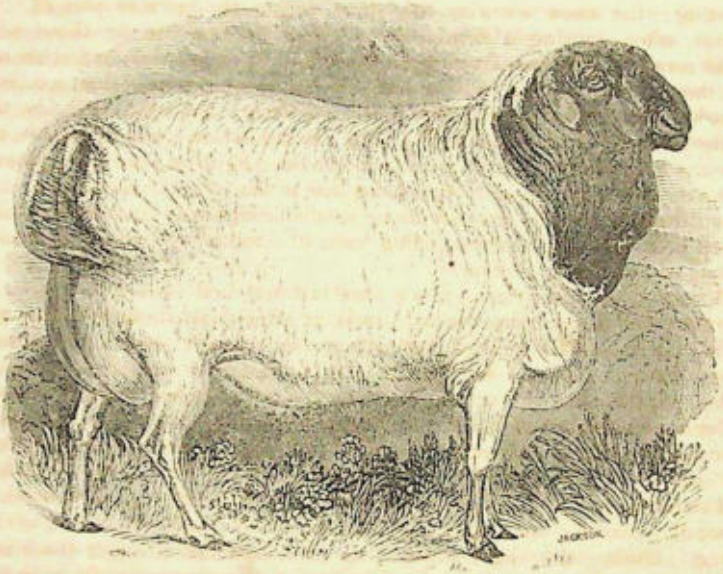
"The Kalmuckian sheep differ from the Kirguise in their smaller size, less curved forehead, lesser although pendulous ears, less hairy wool, and being seldom horned. They are sadly neglected; indeed it is in a manner impossible to compel the Kalmucks to be good agriculturists *."

In the neighbourhood of Caucasus and Taurida, the hind-quarters of the sheep are salted as hams, and sent in great quantities to the northern provinces of Turkey. In the south-east of European Russia, and particularly in the government of Kazan, the wool of the sheep is particularly fine, and almost without any mixture of hair; but, generally speaking, it is coarse, and used only for inferior cloths; but the greater part of the cloths of this description used in Russia are imported. Much of this coarse Russian wool is imported. It is used in the manufacture of carpets, and the list of some cloths is made of it. The present mode of dressing cloths cannot be fully effected except the list is made considerably stronger than the body of the cloth. Low foreign wools are used for this purpose, because they are stronger, and can be procured at less price. Some very fine wool is imported from the south of Russia, and especially from the port of Odessa. The Russian wool is usually very clean and white. It probably is not washed on the back of the animal, but after it is shorn.

THE POLLED FAT-RUMPED SHEEP.

A breed of fat-rumped sheep prevails in Persia. Anthony Jenkinson, in his Travels from Moscow to Khorasan, in the 16th century, thus speaks of them:—"The people have great store of cattel, as camels, horses, and sheep, both tame and wild. Their sheep are of great stature, with large buttocks weighing 60 or 80 lbs. in weight †.

* Agricultural Magazine, Dec., 1804. † Hackluyt's Collection, vol. i. p. 329.



[*The Persian Ram.*]

This cut contains the portrait of a Persian ram, belonging to the Zoological Society of London. It is not of the enormous size just spoken of, but gives a fair representation of the hornless, fat-rumped sheep of the east. The wool, although short, and somewhat curled, is coarse and hairy. This is a fault, however, which, with due care, might probably be removed in the course of a few generations. The level back and belly, the rounded carcass, and the light small leg, would induce the easy belief that from such animal our down and mountain sheep might originally have sprung. There is no irreconcileable difference of form: the only peculiarity is the enlarged buttock. Difference of pasture and of climate might materially effect that; or, what is much more probable, skilful selection and breeding might convert the disposition to accumulate fat on a particular part into a tendency to acquire general good condition *.

The broad or fat-*tailed* sheep are probably varieties of the fat-rumped ones, and will be presently described.

Are there any passages of Scripture which indicate that this breed of sheep, which now mostly prevails in Palestine, and forms the flock of the wandering shepherd there, is the same with that of which the sacred historians often speak? There are passages which seem to have a singular and satisfactory reference to these distinguishing characters of the eastern sheep of the present day.

* Fraser, in his Travels through Khorassan, gives a very sufficient reason why the Persian sheep-owner should be somewhat careless about the improvement of his flock, at least in the neighbourhood of royalty. He says—"The Persian king is a good shot, and delights to shoot at a mark; but he also loves to make his amusement profitable. The mark commonly made use of is a live sheep, near which stands a *furosh* ready to tell the success of the shot, and to dispatch the animal, if only wounded. When his majesty is ready to shoot, he challenges his courtiers about him to bet with him about the shot, and it would be the height of rudeness and impolicy to refuse. The king's game, however, is sure; for whether he strikes the animal or not, the furosh, who has had his lesson, and whose property the carcass is to be, rushes on it the moment the shot comes, with a 'Mash Allah!' (bravo), knocks it down, and cuts its throat; and no one, of course, can question the author of its fate. These sheep are always the property of some villager or farmer near the place, and are never paid for by his majesty."

FURTHER PROOF OF THE PATRIARCHAL BREED.

The Israelites, at first in conformity with the custom of their forefathers, and afterwards by Divine command, offered in sacrifice different animals, as an acknowledgment of gratitude to that Being from whom they derived every good. Sometimes the whole animal was burned; at other times the fat, or the fattest part, was selected, whether because it was the most delicate and valuable part of the animal *, or that it would most readily take fire, and diffuse itself in the air, and rise a grateful offering to Him who was supposed to inhabit the heavens. The book of Leviticus arranges the form and ceremony which was to accompany these offerings. First, it describes the manner in which they were consecrated to their office who were to conduct and preside over these sacrifices. Aaron was brought before the altar, and the "ram of consecration" was led out and slain. And Moses "took the fat, and *the rump*, and all the fat that was upon the inwards," and "burnt them on the altar upon the burnt-offering †." Aaron, after his consecration, makes the first offerings for himself and the people; and when every thing is prepared, the burnt-offering is placed upon the altar, and Aaron "did wash," cleanse from blood, "the inwards and *the legs*, and burnt them upon the burnt-offering upon the altar ‡."

* The substance which was accumulated on the rumps of these sheep, and formed the broad part of the tail in other sheep, consisted more of the nature of marrow than of fat, and was esteemed one of the greatest delicacies that could be presented at the table. Its almost semi-fluid character is very evident in the Persian sheep belonging to the Zoological Society of London.

† Leviticus viii. 25, 28.

‡ Leviticus ix. 14. The question whether the different varieties of the same species of animal have been produced by accidental deviations from one original parent breed, or whether there may not have been, from the beginning, several varieties of the same species, endowed with different qualities, and instincts, and propensities, adapting them to the situation in which they are found, is one of considerable interest to the zoologist, but with which the breeder of any species of animal has little to do. It is also a question difficult to solve—it is one that does not admit of demonstrative proof either the one way or the other, and on which it does not become the candid inquirer to speak positively and with arrogance.

These observations are induced by the careless and presumptuous way in which almost every natural historian at once settles the matter. He does not seem to admit of any doubt respecting the affair, but at once assumes it as a certainty that every species of animal was derived from one original parent, and sets himself to work to inquire which was the parent breed, and, worse than all, derives many fanciful, nay, even some practical conclusions from that which rests at best only on probability. Thus there is scarcely a writer on sheep who does not take the question at once for granted, and describe the Argali, or the Musmon, or some creature of his own imagination, as the common origin of all.

There is no doubt that one variety of domesticated animals, if prevented from mixing with any other, will in general propagate the same kind without any material change. It is also acknowledged that if, from some unknown or accidental cause, an individual is produced, possessing some unusual peculiarities, his progeny, to a certain degree, will probably possess the same peculiarities; and if a male and a female are selected with these peculiarities, and care is afterwards taken to exclude all who have them not, a new and permanent breed may be established. It is likewise sufficiently clear, that climate, soil, and pasture will gradually effect a considerable change in the form and the quality both of the wool and the flesh of every breed. These changes, however, have their limits; they go no farther than producing modifications of the former breed: the essential and distinguishing character may yet be recognised, or, if it should be rendered somewhat obscure, it will burst forth again when the animal regains his native soil and climate.

The question is, when there are varieties of a species essentially and altogether different from each other; when the act of man has and could have little to do in effecting such a difference; when there was nothing to prevent that intercourse which would soon wear down and efface every accidental variety, and restore the primitive character—the question then is, whether these variations are not best explained on the supposition of an original adaptation of each to the situation in which it was placed, and the functions it was to perform.—See Price on Sheep, p. 14.

There is reason to suppose that the breed of sheep which the Israelites tended on their departure from Egypt was essentially the same as that which Abraham possessed and Jacob improved; and these were clearly, by comparison of the two passages just quoted from Leviticus, the sheep whose fat was principally deposited, not on the tail, but on the rump, or on the upper part of the legs as connected with, and forming a part of, the rump.

CAUSE OF THIS PECULIARITY.

Dr. Pallas has some curious speculations concerning this *Uropygium*, or fatty excrescence. Without once inquiring into the actual origin of this sheep, he traces the peculiarity of the rump to "the bitter saline pastures of Tartary, by the influence of which it has gradually augmented in size through a number of generations, like some diseases; insomuch, that the tail has gradually decayed and dwindled away to the little button we find remaining, suffocated, in a manner, by fat, as parts of the human body have been found decayed and diminished in certain cases of unnatural accumulation of fat." He also says, that "the diminution of this mass of fat in the sheep of several of the Tartar hordes is owing to the little wormwood there is in those distticts, and the small quantity of salt with which the pasture is impregnated." And he says, that "when these sheep are transported into the south of Siberia, where the pasture is nearly the same as that on which the Kirguise sheep range, the uropygium shrinks to a very diminutive size."

Certainly, as Dr. Anderson well remarks, this is opening a new and very important question—one that comes home to the business and bosom of the breeder. There is proof enough with regard to every breed, that by luxuriant pasture an animal, and the descendants of that animal, may be forced up far beyond their original size; but is it possible, by dint of pasture, to increase or diminish the bulk of a particular part of the animal, his general frame being at the same time comparatively unaffected? The changes which pasture, accident, different systems of breeding, will speedily produce in the animal generally, and which will soon taint or improve the whole flock, may be easily conceived,—of the changes which disease may effect in any particular organ, or part of the frame, there are abundant proofs, and also of the hereditary character of these transformations. The condition and health and size of the animal may be influenced, and that part on which the fat is especially disposed to accumulate may appear to be more affected than any other; but this is not the question here—the condition and health and size remaining the same, can the comparative bulk of any particular limb or organ be influenced? Certainly by breeding—certainly by remembering the golden rule, that like produces like; but permanently in no other way*.

THE MANAGEMENT OF THE PRIMITIVE SHEEP.

It has already been shown that the sheep-husbandry of the primitive ages was exceedingly simple. It consisted in a continual change of pasture, in a direction, as much as could be contrived, towards the north from winter to summer, and towards the south from summer to winter, and the contriving to pitch the temporary encampment near to some rivulet or well, whence water might be obtained for domestic purposes, and also for the flocks, which could not subsist on the products of a soil generally impregnated with saline matter, without a plentiful supply of this fluid. The driving of the flock to and from the water was the duty of the female part of the family or horde, and often the attending to the sheep during the day, in order to

* See this question treated more at length in Anderson on Sheep, p. 35, &c.

prevent their straying too far from the tents. The shepherd, however, (who was either the head of the family, or his son, or some confidential servant,) was at hand in cases of difficulty or danger; and, when night came on, the sheep were driven to the immediate neighbourhood of the encampment, or enclosed in a fold, and he lay in the midst of them or close by them either in a temporary hut, or exposed to the cold of those regions, more chilling than the heat of the day was oppressive. Jacob expresses in strong terms the occasional sufferings of the shepherd in the discharge of this part of his duty—"In the day the drought consumed me, and the frost by night, and my sleep departed from mine eyes*."

WANT OF WATER.

The occasional suffering from drought has been already hinted at. A traveller gives, from his own experience, an account of the torture that is felt when the water is exhausted on one of the sandy deserts of Africa. "Many perish victims of the most horrible thirst. It is then that the value of a cup of water is really felt. In such cases there is no distinction: if the master has none, the servant will not give it to him, for very few are the instances in which a man will voluntarily lose his life to save that of another. What a situation for a man—a rich one—perhaps the owner of caravans! He is dying for a drop of water, no one gives it to him; he offers all he possesses, no one hears him; they are all dying, though by walking a few hours further they might be saved. The camels are lying down, and cannot be made to rise; no one has strength to walk; only he who has a glass of that precious liquid lives to walk a mile farther, and then perhaps dies too. If voyages on seas are dangerous, so are those on land. At sea, one meets with pirates—they rob, we surrender or die; in the desert, they rob the traveller of his property and water; they let him live perhaps, but what a life! to die the most barbarous and agonizing of all deaths. In short, to be thirsty in a desert, without water, exposed to a burning sun, without shelter, and no hopes of finding either, is the most terrible situation a man can be placed in, and I believe one of the greatest suffering that a human being can sustain. The eyes grow inflamed, the tongue and lips swell, a hollow sound is heard in the ears which is followed by deafness; the brains seem to grow thick, the sufferer is beside himself—mad; all these feelings arise from the want of a little water; and in the midst of this misery the deceitful mirages appear to him. A broad expanse of water, clear as crystal, suddenly opens to his view. Faint and weary under the fierce sunbeam, he gazes on the unexpected relief with ineffable delight, and fondly anticipates a speedy termination to his present distress. He sees the foremost cattle enter the lake, and the water dashed about by their feet. He quickens his pace and hastens to the spot, when to his utter disappointment the pool disappears, and nothing remains but the dry and thirsty wilderness†." The reader will hereafter enter into the full force of what is meant by the '*living*,' the real fountains of water, said in the Scriptures to be prepared for his flock by the great Shepherd.

COLD.

In Europe, the days and nights seem to correspond naturally with the seasons and with each other: but it is quite otherwise in the East. In Lower Asia, in particular, the day is always hot, and as soon as the sun is fifteen degrees above the horizon, no cold is felt even in the depth of winter. On the contrary, in the height of summer the nights are intensely cold, and the better sort of the inhabitants are all clothed in furred garments, as the only means by which they can resist the chilliness of the air. A

* Gen. xxxi. 40. † Belzoni's Researches in Egypt, p. 342.

traveller says, " sometimes we lay at night out in the open air, sooner than enter a town, on which occasions I found the weather as piercing cold as it was distressingly hot in the day time *."

WILD BEASTS.

Every portion of the country which they traversed was probably as much infested with wild beasts at that period as at the present day, or even more so, for fewer caravans then crossed the desert to disturb or destroy these unpleasant inhabitants. Jacob refers to them, and to the ravages which they committed—" That which was torn of beasts I brought not unto thee ; I bare the loss of it†." David also draws a lively picture of the danger to which the shepherd was exposed from this cause—" Thy servant kept his father's sheep, and there came a lion and a bear and took a lamb out of the flock, and I went after him, (each of them in his turn), and smote him, and delivered it out of his mouth, and when he arose against me, I caught him by his beard, and smote him, and slew him, thy servant slew both the lion and the bear ‡." So, many centuries afterwards, our Saviour speaks of the hireling fleeing and leaving the sheep when he saw the wolf coming, and of the good shepherd giving his life for the sheep§.

The following passage from Haynes's Travels gives a dreadful account of the present state of a portion of the country over which the flocks of the Patriarchs periodically ranged ; and the reader may form some idea of the dangers to which the ancient shepherd was occasionally exposed. " The approaching to Lene at close of day, as we did, is at once terrifying and dangerous. The surrounding country swarms with wild beasts, such as tigers, leopards, and jackals, whose cries and howlings would strike the boldest traveller, who has not been frequently in a like situation, with the deepest sense of horror ‖."

THE ANCIENT DOG.

It would seem in early times, as now, the shepherd had his attendant dog. Job speaks of those " whose fathers he would have disdained to have set with the dogs of his flock ¶ ;" and Isaiah calls upon " the beasts of the forest to come to devour, for the shepherds cannot understand, the watchmen are blind, and they are all dumb dogs that cannot bark, sleeping, lying down, loving to slumber**." The duty of the dog, however, extended no further than guarding the flock from the attack of wild beasts: and, like the Spanish sheep-dog of the present day, he had nothing to do with the management of the sheep: on the contrary, he was a kind of abomination with the Israelites, and if not carefully watched, was more destructive to the sheep than the beast of whose approach he was to give warning. Taken away from this duty, he was a common pest and destroyer. The Psalmist refers to this when he speaks of dogs having compassed him about††; and it is remarkable that there is not an encomium passed upon the dog in the whole of the sacred volume‡‡.

* Sir John Chardin's Travels. See also Burden's Observations on Gen. xxxi. 40.
† Gen. xxxi. 39. ‡ 1 Sam. xvii. 34—36. § John x. 12.
‖ Harmer's Observations, vol. iv. p. 171. ¶ Job xxx. 1.
** Isaiah lvi. 9, 11. †† Ps. xvii. 16.

‡‡" The dog loses in Barbary, as in the East in general, a part of those social qualities which make him the friend of man. He is no longer that domestic, mild, insinuating animal, faithfully attached to his master, and ever ready to defend him, even at the expense of his own life. Among the Arabs, he is cruel, blood-thirsty, always hungry, and never satisfied. His look is savage, his physiognomy ignoble, and his appearance disagreeable. The Moors grant him indeed a corner in their tent, but that is all. They never caress him, never throw him anything to eat. To this treatment, in my opinion,

THE SHEPHERD'S COMMAND OVER HIS FLOCK.

Not possessing the assistance which the modern shepherd in enclosed countries derives from his intelligent and faithful dog, the keeper of the sheep, both in ancient and modern times, thrown upon his own resources, acquired a command over his flock which would be deemed almost incredible. Our Saviour, when delineating his own character, gives an interesting picture of the Jewish shepherd. "The sheep hear his voice, and he calleth his own sheep by name, and leadeth them out, and he goeth before them, and the sheep follow him, for they know his voice *." In a wild and boundless desert, and without his quadruped helper, it was necessary that he should have this command over them; and he acquired it by being always among them, and by treating them kindly. In a country enclosed according to the modern system, and where there are laws to restrain the plunderer, the shepherd may safely leave his sheep by night as well as by day. On our most extensive downs and wildest mountains he depends chiefly on the exertions of his dog to keep the sheep from wandering, to collect them at even, and to drive them to the fold. The eastern shepherd can only accomplish his task by exercising another kind of power over his flock, namely, that of attachment and confidence †.

"I asked my man," says Mr. Hartley, who was travelling through Greece, "if it was customary to give names to sheep. He informed me that it was, and that the sheep obeyed their shepherd when he called them by their name. This morning I had an opportunity of verifying the truth of his account. Passing a flock of sheep, I asked the shepherd the same question that I had put to my servant, and he gave me the same answer. I then bade him to call one of his sheep. He did so, and it instantly left its pasture and its companions and ran up to the hands of the shepherd with signs of pleasure, and with a prompt obedience which I had never seen excelled in any other animal. He told me, also, that many of his sheep were still 'wild,'—that they had not yet learned their names,—but that by teaching they would all learn them. The others which knew their names he called 'tame ‡.'"

This, perhaps, is a portion of sheep-management somewhat too much neglected. Why not give names to all the sheep, as well as to the prize

must the indifference of dogs towards their master be ascribed. Very often they have not any master. They choose a tent as a place of refuge; they remain there, and no further notice is taken of them. Refuse carrion, filth, anything is good enough for them if they can but appease their hunger. They are lean and emaciated, and have scarcely any belly. They seldom bite one another; but they unite against a stranger who approaches the Arab tents, furiously attack him, and would tear him to pieces if he did not seek safety in flight from this starved troop. If any person were unable to defend himself, or had the misfortune to fall, he would be in danger of being devoured, for these dogs are very greedy after human flesh."—Poiret's Travels in Barbary, vol. i. p. 253.

"During all the long tour through this dreary and melancholy city (Alexandria in Egypt), Europe and its liveliness were pictured to me only by the bustle and activity of the sparrows. I here no longer recognised the dog, that friend of man, the attached and faithful companion, the lively and honest courtier; he is here a gloomy egotist, unknown to the host under whose roof he dwells, cut off from human intercourse, without being the less a slave; he does not know him whose house he protects, and devours his corpse without repugnance."—Denon's Travels in Lower Egypt, p. 32.

* John x. 3, 4.

† Our sheepe do not follow their shepherds as they do in all other countries; for the shepherd goeth before and the sheep follow like a pack of dogs. This disobedience of our sheepe happens to us, because we let them range night and day in the field without a shepherd, which other countries dare not for feare of wolves and other ravenous beasts, but are compelled to guard them all day with great dogs, and to bring them home at night, or to watch them in their folds.—Samuel Hartlib's Legacie, 1651, p. 97.

‡ The Rev. John Hartley's Journal, Penny Magazine, Oct. 13, 1832.

ones and the bullocks? The English shepherd professes to recognize every sheep in his flock, almost as well as the huntsman knows every dog in his pack. The latter has long been accustomed to give to each hound his name, and much of the tractability and obedience of the pack depends on each individual of it recognizing first his peculiar name, and, very soon afterwards, the command, or encouragement, or intimation of displeasure that is addressed to him. This mutual recognition between the shepherd and his charge did not, perhaps, extend to every individual, and could not, if the flock was as numerous as it is described to have occasionally been in ancient times; but he selected some of the older rams whom, by feeding from the hand and other kind treatment, he accustomed to come at his call, and gradually to understand and obey his directions, and whom the rest of the flock would immediately follow *. By degrees these selected animals would perfectly understand the language or gestures of the shepherd, and at his command, and sometimes of their own accord, would collect the stragglers, and marshal them in regular order, and direct the march of the flock.

Lucian speaks of Polyphemus, the first shepherd of whose management of his sheep profane history gives any account, as ordering the ram what things he ought to do.

Homer compares Ulysses drawing up his men to a ram ordering his flock—

> From rank to rank he moves and orders all:
> A stately ram thus measures o'er the ground,
> And, master of the flock, surveys them round.
> POPE'S TRANSLATION†.

* There is no animal in which the principle of imitation is so strong as in the sheep. It seems to have been wisely and kindly implanted in one of the most valuable and defenceless and wandering of the domesticated animals, in order that it might be observed and taken advantage of by the intelligence of man. The leaders of the flock having been instructed and rendered manageable, the obedience of the rest is secured. It is often exceedingly difficult to drive a parcel of sheep into a narrow and unaccustomed passage or way, but if one of them is dragged even with violence into the place, the rest follow without the slightest trouble.

Mr. Wilson quotes from Dr. Anderson a ludicrous illustration of this principle:—"A butcher's boy was driving some fat wethers through Liverpool, but they ran down a street along which he did not want them to go. He observed a scavenger at work with his broom a little way before him, and called out loudly to him to stop the sheep. The man accordingly did what he could to turn them back, running from side to side, always opposing himself to their passage, and brandishing his broom with great dexterity, but the sheep, much agitated, pressed forward. At last one of them came right up to the man, who, fearing it was about to jump right over his head while he was stooping, grasped the short broomstick in both hands, and held it over his head. He stood for a few seconds in this position, when the sheep made a spring and jumped fairly over him without touching the broom. The first had no sooner cleared this impediment than another followed, and another, in such quick succession, that the man, perfectly confounded, seemed to lose all recollection, and stood in the same attitude till the whole had jumped over him, not one of them attempting to pass on either side, though the street was quite clear. As this took place during wet weather, the man was entirely bespattered over with dirt before they had all passed, and it is impossible to conceive a more ludicrous appearance than the poor fellow made on the occasion."—Illustrations of Natural History, vol. i. p. 112.

The Annual Register for 1808 affords two illustrations of this principle, of a very different character. "A few days since a serious accident happened to a flock of sheep, the property of Mr. Cooper, of Hailston Hall, who had intrusted them to the care of a boy for that day, in the absence of the shepherd, who was assisting in getting in the harvest. About the middle of the day the sheep broke from their pasture, when the thoughtless boy hastened them back again over a narrow and deep ditch. The leading sheep fell in, and the remainder passing over them, smothered twenty-five sheep and forty lambs, the whole being worth 70*l.* or 80*l.*" It is stated in the same volume that "Mr. Sparks, near Guildford, had more than eight hundred sheep in one pasture field, when being frightened by a dog, one of them jumped into an adjoining field, which was on a great descent, and then followed each other over the gap of the hedge so fast, that one hundred and twenty-three of them were killed."

† Even at the present day, and where the use of the sheep-dog is known, Daubenton

THE MUSIC OF THE SHEPHERDS.

Ancient writers describe the shepherds of the early times as exerting considerable influence over their flocks by the power of music. Orpheus was a shepherd, and strange is the account of the magic of his pipe. Apollo, during nine years, kept the flocks of Admetus, and his rival, Pan, was also a shepherd, and, although easily vanquished when he ventured to contend with the god of music, discoursed eloquently upon the pipe. David was taken from the sheep of his father Jesse, and made the armour-bearer of Saul; and "when the evil spirit, the fit of melancholy, was upon Saul, David took a harp and played with his hand, and Saul was refreshed and was well, and the evil spirit departed from him*."

The pastures on which the sheep of the olden times fed, consisted of immense plains, or occasionally of abrupt alternations of hill and vale, with many a tangled copse and forest, so that the sheep, or a portion of them, were often out of the sight of the keeper, and occasionally beyond the reach of his voice: he therefore had a horn, or pipe, by means of which he could be heard at a greater distance, and the well-known sound of which the leaders of the flock would immediately obey. To while away the time, he would, perhaps, occasionally endeavour to draw other and more pleasing sounds from this instrument so necessary to his vocation, and thus he would naturally, or almost necessarily, become, to a greater or less degree, a musician: therefore the interesting stories of the poets are not all fictions; and it can easily be imagined that the shepherd would often be found playing on his pipe in the midst of his flock, and they apparently attentive to, and pleased with, the strain, for they would have sufficient intelligence to associate with it a sense of the kindness and protection they experienced from the player.

Goldsmith gives the following account of the shepherd-musician:—"Before I had seen them trained in this manner, I had no conception of those descriptions in the old pastoral poets, of the shepherd leading his flock from one country to another. As I had been used to see these harmless creatures driven before their keepers, I supposed that all the rest was pure invention; but in many parts of the Alps, and even some provinces of France, the shepherd and his pipe are still continued with true antique simplicity. The flock is regularly penned every evening, to preserve them from the wolf, and the shepherd returns homeward at sunset with his sheep following him, and seemingly pleased with the sound of the pipe, which is blown with a reed, and resembles the chanter of a bagpipe†."

Some illustrations of the command of the shepherd over his flock will be given when the management of the Spanish flocks in their annual peregrinations is described; one pleasing instance of it, however, the sheep-husbandry of Messrs. Nowlan, of Kilkenny, will afford. Their stock in 1820 consisted of 600 pure Merinos. During the summer they were pastured upon a farm of good natural herbage improved by grass-seeds and clover; in winter they were housed in the day during wet

thus describes the duty and the practice of the French shepherds. "They select certain sheep from the flock; they give them particular names, and teach them to come when they are called. In order to accustom them to this, they make the sheep follow them by offering them a piece of bread. When the shepherd wishes to lead his flock through a defile, or to make them change the direction in which they are proceeding, he calls to him one of these selected sheep. Those that are nearest to him immediately follow, and the others are not far behind, and so by degrees the whole flock is disposed to obey the call of the shepherd, and to follow him."—Instructions pour les Bergers, p. 15.

* 1 Sam. xvi. 14-23.

† Goldsmith's Animated Nature, vol. ii. p. 59.

weather. They were all under the charge of one young man. No dog was permitted, all was done by the shepherd himself. At the sound of the horn all the sheep flocked around him if he stopped, and followed him if he moved forward. Salt was the medium by which this docility was chiefly produced, and the reporter adds,—"any shepherd who accustoms his sheep to the use of salt, and carries a little about him as a reward for their attention to his call, will be followed by them wherever he pleases to lead the way."

The farm is divided by the King's River, at times so rapid and impetuous as not to be fordable by the strongest horse. A plank bridge, about eighteen inches wide, and one hundred and ten feet long, with a head-rail on one side, is thrown across for the convenience of passengers. When it is necessary to move the sheep from one side of the river to the other, the shepherd has only to cross this plank, sounding his horn, and each individual of the flock paces regularly after him in single file, without any instance of casualty, even at the time of the highest floods*."

This kind of sheep-management is not, however, to be expected in the present day, nor could it be made compatible with the altered and improved state of British husbandry; but there are several passages in the older writers on agriculture, which abundantly prove that this part at least of the patriarchal system was not unknown by the British shepherds. Barnaby Googe, who wrote in 1614, and from whom some excellent maxims will be occasionally quoted, thus expresses himself,—there is, perhaps, a little of the romance of the pastoral life of former times about it, but it was well founded on the habits of the animal, and the customs of the times. "Moreover, the shepherds must deale gently and lovingly with their flocke, and comforting and cheering them with singing and musicke, for this kind of cattel taketh great delighte in musicke; and it doth them as much good as their pasture. Beside, they must be well ware in the driving of them and ruling of them, that they guide them with their voice, and shaking of their staffe, and not hunting of them†."

THE HUMANITY OF THE SHEPHERD.

Connected with this is another interesting feature in the character of the nomadic shepherd—humanity. Their frequent change of situation in search

* The Farmer's Magazine, August, 1820. The use of the horn for the collecting and management of sheep was well known in early times. Polybius says that the flocks in the island of Cyrnon, on the landing of any stranger, always fled into the interior of the country, but when the shepherd blew his horn, they scampered around him and forgot all fear.—See also Bulkeley's Notes on John x. 4.

Other domesticated animals have been taught the same obedience to the herdsmen. "In Lithuania and Muscovy, as soon as the sun has risen, the herdsman daily winds his horn. On the well-known signal, the stalls being instantly opened, the horses, mules, asses, goats, heifers, and bulls obey the signal without reluctance. As soon as they are assembled in a body, he marches at the head of them, while they quietly follow their leader into such meadows as he sees most convenient for them. By a second signal they are led to water, and, by a third, re-conducted home again, where each repairs to his own proper stall without the least disorder or confusion."—Nature Delineated, vol. iii. p. 25.

"The shepherds in Sweden, as well as in Iceland, have horns made of birch-wood. Two excavated pieces of birchwood are fitted together, and bound tightly round with the bark of the same tree, so that one circular pipe is formed. The sound made by this horn is shrill, but not unpleasant. The sheep and cattle will come together at certain places and times obedient to this call."

It is in the same manner that the cattle are collected by the herdsmen of the Alps.—Acerbi's Travels in Sweden and Lapland, vol. i. p. 30.

† Dyer, in his "Fleece," speaking of the "airy downs and gentle hills," the open and elevated country, where this system of management might be with most advantage

of pasture and of water, and the long marches which they were sometimes obliged to take when many of the lambs were newly dropped, or the ewes were big with young, compelled them to adopt a system of attention and kindness to their flocks, which, not being required from the modern shepherd, is not practised or understood by him. Thus Jacob addresses Esau—"My Lord knoweth that the children are tender, and the flocks and herds with young are with me; and if men should overdrive them one day, all the flock will die*." Thus the prophet speaks of the Messiah—"He shall feed his flock like a shepherd; he shall gather the lambs with his arm, and shall carry them in his bosom, and shall gently lead those that are with young." In the descriptions already quoted of the manner in which encampments of the shepherds are moved, provision is always made for the young lambs. "Some beasts of burden, guided by the young men, bear the little ones just dropped, and not able to travel†." "The little children, just able to toddle along themselves, are employed in driving, at their own slow pace, the lambs a little older‡." "One evening," says M. de Brisson, in his history of his captivity among the Arabs, "as I was returning with our flock, one of the ewes brought forth a lamb on the declivity of a little hill; I took it up in my arms, and, with equal care and tenderness, hasted to carry it to the tents."—P. 37.

"In flowery spring-time, when the new-dropped lamb,
Tottering with weakness by its mother's side,
Feels the fresh world about him, and each thorn,
Hillock, or furrow, trips his feeble feet,—
Oh, guard him carefully! §"

Sir John Chardin, undesignedly, gives a satisfactory comment on Jacob's apology to Esau for not attending him on his journey. "Their (the Arabs') flocks feed down the place of their encampment so quick, by the great numbers which they have, that they are obliged to remove them too often, which is very destructive to the flocks, on account of the young ones which have not strength enough to follow ‖."

The parable of Nathan describes the fondness for animals, and the care

adopted, and describing the usual healthiness of the sheep in such situations, says, that they

"Nor of halt,
Hydropic tumours, nor of rot, complain;
Evils deformed and foul; nor with hoarse cough
Disturb the music of the pastoral pipe;
But crowding to the note, with silence, soft,
The close-woven carpet graze."—Book I.

Ellis, in his "Shepherd's Guide," quoting from an old French author, says, "He must accustom himself to two sorts of cries, the one pleasant and shrill, to make them go forward; but another and diverse cry to call them back, that the sheep, hearing these two different cries, may learn and apply themselves to do that which thereby is commanded them. He must sometimes make them merry, cheering them up with songs or else by his whistle and pipe, for the sheep at the hearing thereof will feed the more hungerly: they will not straggle so far abroad, but they will love him the better." "Hence it is, I suppose," Ellis adds, "that some shepherds divert themselves with playing on the tabor and pipe, as some do at this time in England, and as they did in France when this French author wrote."—P. 3.

The same quaint but valuable writer describes a person who lived in the neighbourhood of Hempstead in 1747, that was remarkable for the loudness of his whistle, and who was called "the Whistling Shepherd." "He had by means of it a perfect command of his dog, who left off driving the flock, or a single sheep, and came to him at once from a considerable distance, and who had equal command over his sheep; for as soon as he appeared at the end of the field or the common, and gave the usual signal, although scattered widely apart, they would immediately form into a close compact body and march towards him."—P. 63.

* Gen. xxxiii. 13. † Buckingham's Palestine.
‡ Buckingham's Palestine. § Dyer's Fleece, Book I.
‖ See also Harmer's Observations, vol. i. p. 126.

bestowed on them occasionally exhibited by the people of that time. It was evidently a picture of home life. "There were two men in one city, the one rich, and the other poor. The rich man had exceeding many flocks and herds, but the poor man had nothing but one little ewe-lamb, which he had bought and nourished up, and it grew up together with him and with his children: it did eat of his own meat, and drank of his own cup, and lay in his bosom, and was unto him as a daughter *."

SHEEP-SHEARING.

At what period the grand improvement in the management of the sheep, the periodical separation of the wool from the pelt—the shearing—was introduced, is not known. It had probably been observed that in most climates in which there is considerable difference of temperature between the winter and the summer, the fleece is naturally detached during the latter season. As the spring advances, it is no longer needed to defend the animal from the cold—it has become, from its weight and its warmth, a nuisance rather than a comfort—the supply of nutriment is therefore cut off at the base, the bulb whence it sprung withers away, its attachment to the skin ceases, and it is only held on the back of the animal by the interlacing and entanglement of its fibres. Portions of it are now torn off by every thicket, and become lost or spoiled. The ingenuity of the sheep-owner would be exercised in saving as much of the wool as he could. He would watch the time when it was beginning to be thrown off, and he would endeavour to hasten the natural process. The earliest and rudest method was to drive the flocks hastily through a narrow passage, when by their pressure against each other the greater part of the fleece was loosened, or completely detached.

To this succeeded another mode, which had an appearance of inhumanity about it. The sheep was caught and the fleece was pulled from its back. The animal, however, did not often experience much pain in this operation, for when the fleece began to be so loosely attached to the pelt that it was separated by almost everything against which it rubbed, no great force was needed to separate it entirely †.

Of one of the varieties of the sheep of the patriarchs—the Persian—it is reported that when they feed upon the new grass between January and May, the whole of their fleeces drop off as it were spontaneously, and the animals are left "as bare" (in the elegant language of the author, Yarrenton) "as a scalded sucking-pig ‡." There is no proof, however, that this was the case with the ancient Persian sheep, much less that it could be affirmed of the flocks of the patriarchs generally. The shepherd watched the time when the outer layer of wool began to separate, and being assured from long experience that it was usually about the same season of the year, a happy thought suggested the use of the shears, in order to secure the whole of the fleece in its most perfect state.

* 2 Sam. xii. 1, 2, 3. Bochart gives several illustrations of their humanity to animals. Hieron., p. i. lib. ii. ch. 43.

† If Mr. Low's account, however, is to be credited, too much cruelty does sometimes accompany this method of obtaining the fleece. He thus describes the practice which prevailed in the Orkney Islands in his time. "About midsummer there is a particular day published for *rooing*, when all the men in the parish attend with their dogs, turn out and drive the whole flock, without any preparation of washing, into narrow pens, and from thence I may say to the place of execution, where the wool is torn off their backs; an operation which brings their whole blood into their skin, and is not only disgusting, but, if the season proves harsh, is the cause of great destruction. But, however cruel it may seem, it is almost the only notice that is taken of these useful animals by their unfeeling masters until that time twelvemonth."—Fauna Orcadensis, p. 7. In Iceland, also, the sheep are never shorn, but the wool is pulled off by the hand when it has become loose.—Gill's Technological Repository, vol. ii., p. 18.

‡ Agricultural Magazine, July, 1810.

Most of those who have treated on the early history of this animal have traced the practice of sheep-shearing to the time of Hesiod. By him, in fact, it is first mentioned as having been common among the Greeks, but the sacred writings prove that it was of much earlier date. Eighteen hundred years before the birth of Christ, and nine hundred before the time of Hesiod, is it recorded that "Laban went to shear his sheep*."

These wandering shepherds, however inferior they might have been to other nations in many of the arts of civilized life, far excelled them in the management and care of these useful animals. When Rome was founded, two hundred years after the time of Hesiod, the custom of pulling instead of shearing off the wool prevailed. The word *vellus*, a fleece, was derived from the pulling or tearing away of the wool; and the part of the Palatine Hill called *Velleia* was so named on account of its being the spot where the Romans used to pull their wool, before the Etruscan method of shearing was introduced. When Rome was in the zenith of her glory, the more effectual and humane operation of shearing was not universally adopted in Italy. Pliny expressly says, "the sheep are not everywhere shorn, but the custom of pulling off the wool (*vellendi mos*) continues in some places;" and he adds, that which was a disgrace to the age, "that the poor animals were kept fasting three days before the 'pulling,' in order that, the sheep being thus rendered languid and exhausted, the roots of the wool might be more easily detached." How superior to the conquerors of the world do the patriarchs appear in the noblest art, that of humanity†!

It was not every where in the eastern countries that convenience could be found for the washing, which then, as in most places now, preceded the shearing; and Laban was compelled to drive his flock to a considerable distance for this purpose; it was not until "the third day" that "it was told Laban that Jacob had fled‡."

Of the preparation for, and the manner in which the operation was performed, it could not be expected that these early records would speak; but there can be no doubt that when sheep were so numerous, and formed so considerable a part of the riches of the owner, every convenience would be provided for the occasion: accordingly a building seems to have been erected for this especial purpose. Jehu "slew the brethren of Ahaziah at the pit of the shearing-house§." This was nearly nine hundred years after that change of colour in the sheep, first introduced by Jacob, which rendered "the pit of the shearing-house," the pool in which the sheep were washed previous to the shearing, absolutely necessary.

Then, as now, the sheep-shearing was the season of peculiar rejoicing. It was the harvest of the shepherd, and when he had gathered it, a good feeling taught him, as it has taught the agriculturist in every country and time, to make glad the hearts of the labourers for a few hours at least. Even churlish Nabal could not refuse this, for he asks of the servants of David, "Shall I take my bread and my water, and my flesh that I have killed for my shearers, and give it unto men whom I know not whence they be?" At a little later period another, but not very pleasing, account is given of the festivities of that season: "And it came to pass that Absalom had sheep-shearers in Baal-hazor, and Absalom invited all the king's sons, and Absalom commanded his servants, saying, When Amnon's heart is merry with wine, then kill him‖."

* Gen. xxxi. 19.

† See Wilson on the Sheep. Quarterly Journal of Agriculture, vol. ii. p. 365.

‡ Gen. xxxi. 22. § 2 Kings x. 13-14.

‖ 2 Sam. xxiii. 23, 28. The close of harvest was a season of rejoicing in most of the ancient nations, and sheep-shearing was the harvest of the nomadic shepherd. This periodical festival was even enacted by law. Cecrops, the founder of the kingdom of Athens, about the time of Moses, ordained that "the master of every family should after

Without entering at present into the question relating to hogget-wool, or the period of the first clipping of the lamb, it may be mentioned that there is a passage in Deuteronomy which may account for the origin of the delay of the first shearing. It has principal reference, however, only to the firstlings or the first born of the flock, which were claimed for religious purposes. "All the firstling males that come of thy herd, and of thy flock, thou shalt sanctify unto the Lord thy God; thou shalt do no work with the firstling of thy bullock, nor shear the firstling of thy sheep*."

One passage more with reference to the shearing of the sheep will place the docility of that animal, and the humanity of the shepherd, in a very pleasing point of view: it is the account given by the prophet Isaiah of the sufferings of the Messiah, and the meekness with which he endured them. "He is brought as a lamb to the slaughter, and as a sheep before her shearers is dumb, so he openeth not his mouth†." He who has witnessed only the noise, and confusion, and frequent brutality of a modern sheep-shearing, can with difficulty picture to himself quietude in the sheep so complete as this. One, however, who witnessed the management of the sheep in Palestine, a philosopher, a Jew, without direct reference to this passage, and without seeming to have it in his mind, gives a perfect commentary on it. "Woolly rams laden with thick fleeces put themselves into his hands (the shepherd's) to have their wool shorn, being thus accustomed to pay their yearly tribute to man, their king by nature. The sheep stands in a silent inclining posture, unconstrained under the hand of the shearer. These things may appear strange to those who do not know the docility of the sheep, and shepherds might be much assisted in this government by giving them names while in the state of lambs, and using them to go and come daily by those names‡."

There are not any passages which indicate that the Israelite shepherds were in the habit of clothing their sheep after the shearing. There is no reason to suppose that these animals ever became so excessively fat as to render it necessary for them to be shorn in an early period of the season, and thus be exposed to danger from the cold: and then only could clothing be justified on account of the expense with which it is attended, whatever may be said of its effect on the sheep and the wool§.

It is certain, however, that the Greeks were accustomed to clothe their flocks. "Pursuing our walk," (in the neighbourhood of Athens,) says the pretended but highly instructive Anacharsis, "we passed by a numerous flock of sheep, preceded and followed by dogs to drive away the wolves (Xen. Memor. lib. ii. p. 757): a covering of skin was wrapped round each sheep. This practice, which has been borrowed from the Megareans (inhabitants of the Isthmus of Corinth, Lus. in Areopag. p. 136 and 143), defends the wool from the filth which might otherwise defile it, and prevents it from being torn by the hedges. I know not whether it contributes to render the wool finer, but I can affirm that the wool of Attica is extremely fine‖." (Varr. de Re Rustica, lib. ii. c. 2.)

The system of *cotting* was known and adopted by the Israelites. After repelling the invasion of Sennacherib, Hezekiah applied a portion of the spoil to works of public utility; he built "storehouses, for the increase of

harvest make a feast for his servants, and eat together with those who had taken pains together with him in tilling his ground." See Burder's Oriental Literature, vol. ii. p. 77.

* Deut. xv. 19.

† Isaiah liii. 7.

‡ Philo-Judæus on the Creation, c. i.

§ Young's Annals of Agriculture, vol. xii. p. 515.

‖ Travels of Anacharsis the Younger in Greece, vol. iv. p. 519.

corn, and wine, and oil, and stalls for all manner of beasts, and cotes for flocks*." This has reference more to the inhabitants of considerable towns or cities than to the wandering shepherds, of whom principally mention has hitherto been made.

A very curious, but not accurate, account of the earliest system of cotting is given by a writer in the Annals of Agriculture. He says that "the ancients were so perfectly satisfied that a variety of climate was absolutely necessary to the production of fine wool, that those people whose situation admitted not of any change, had recourse to art,—housing them from the day to defend them from the too powerful rays of the sun, and exposing them to the cold of night. This was practised by Hezekiah; Columella informs us that the same conveniences were adopted in Greece and Tarentum, and there is a line in Milton's Lycidas confirming the custom of their nocturnal exposure:—

'Battening our flocks with the fresh dews of night.'"

The cotting which has been practised in modern times, however, has had universally reference to the night. The sheep are collected together in these buildings for the double purpose of defending them from the cold, and preserving their dung as manure; and, from the accounts which are given of the sheep-husbandry of the remotest times, it is clear that these were the objects of the primitive shepherds. Polyphemus is represented by Homer as driving his flock at eve to his rude cote, a rocky cave †. Virgil expressly describes the cote as designed to "fend the bitter cold, and prevent the diseases produced by it ‡." The same poet furnishes a satisfactory explanation of Milton's dews of night, when, not having the modern fear of the early dew before his eyes, he counsels,—

"Before the sun, while Hesperus appears,
First let them sip from herbs the pearly tears
Of morning dew §."

They were to "batten on the fresh dews of night" before these were evaporated by the rising sun; and Columella himself speaks of "the folds not being resorted to on account of the great number of wolves,—the hurdles of which they were composed affording a very insufficient protection from these animals,—but, in order that their dung might be saved, buildings were erected into which they were driven every night all the year round ‖."

WEAVING.

Of the use of the wool for clothing, in those early times, the scriptures afford many unequivocal proofs. Job, who is supposed to have lived

* 2 Chron. xxxii. 28.

† Odyssey, lib. ix.

‡ Incipiens stabulis edico in mollibus herbam
Carpere oves, dum mox frondosa reducitur æstas:
Et multa duram stipula, filicumque maniplis
Sternere subter humum, glacies ne frigida lædat
Molle pecus, scabiemque ferat, turpesque podagras.—Georg. III. v. 293.
First with assiduous care from winter keep
Well foddered in the stalls thy tender sheep.
Then spread with straw the bedding of thy fold,
With fern beneath, to fend the bitter cold.
That free from gout thou may'st preserve thy care,
And clear from scabs produced by freezing air.—Dryden.

§ Georgic III.

‖ Bradley's Synopsis of Columella, &c., p. 59.

before the escape of the Israelites from Egypt, says, "Let me be condemned if I have seen any perish for want of clothing, or any poor without covering; if his loins have not blessed me, and if he were not warmed with the fleece of my sheep*": *i. e.*, if his loins did not admonish him to bless me when he felt himself warm by the clothing made from my wool. Woollen cloths, then, furnished a part of the usual dress. But might not this cloth have been produced by the first and rudest process of manufacture,—the beating and compressing of the wool together,—and by means of which the fibres were entangled and adhered, and a coarse, yet comfortable kind of cloth, was made? The same book will settle this question: Job is complaining of his sad estate, and fancies himself near unto death, and he says, "My days are swifter than a weaver's shuttle†"; swifter than its motion through the warp that is stretched across the machine. This affords an unequivocal proof that the art of weaving was then known.

A comparison with other passages will show that this art was in no rude state, and therefore, probably, was of no recent invention; for, in order to repress that pride in gaudy apparel which is the foible of every age, the Jews are forbidden to wear clothes made of two different materials, as linen and wool interwoven‡. The skill of the manufacturer is also spoken of in very high terms. Moses alludes to those whom "God had filled with wisdom of art (all human acquirements are naturally traced to Him by whom the spirit of intelligence was originally bestowed) to work all manner of work of the engraver, and of the cunning workman, and of the embroiderer in blue and in purple, in scarlet and in fine linen, and of the weaver, even of those that devise cunning work§."

It will now be natural to look back to the history of Joseph, three hundred years before the escape of the Israelites from Egypt, and inquire whether the coat of many colours with which a fond and foolish father decorated a favourite son, was not likewise a proof that the art of weaving woollen cloth then existed, and, even among the wandering shepherds, had attained a considerable degree of perfection. It is at least a proof that the art of dyeing was known and commonly practised.

Very early in the history of the Twelve Tribes after their settlement in Canaan mention is made of the employment of the women in weaving. When Samson slept in the lap of Delilah, she was busily employed in using his hair as the warp of her loom.

"If," said he to his false mistress, "thou weavest seven locks of my head with the web, I shall be in thy power. And she did so; and she fastened it with the pin, and said unto him, The Philistines be upon thee, Samson. And he awaked out of his sleep and went away with the pin of the beam, and with the web‖."

A short time after the period in which Samson lived, it is recorded that the mother of Samuel "made him a little coat, and brought it to him from year to year," when she came up with her husband to offer yearly sacrifices. And, at a somewhat later period¶, Solomon thus describes the good wife,—"She seeketh wool and flax, and worketh willingly with her hands. She perceiveth that her merchandise is good. Her household are clothed with scarlet**."

* Job xxxi. 20.
† Ib. vii. 6.
‡ Deut. xxii. 11.
§ Exod. xxxv. 35.
‖ Judges xvi. 14.
¶ Sam. ii. 19.
** Proverbs xxxi. 13, 18, 21.

THE EARLY SHEPHERDS THE INVENTORS OF WEAVING.

Moses legislated some centuries before the golden fleece arrived in Greece; and the Patriarchs tended their flocks long ere the inhabitants of that country began to be civilized. The art of manufacturing the fleece of the sheep into clothing was well known by the early shepherds,—not merely the rude process of felting, but the superior pliability, and beauty, and easiness of adaptation, and comfortable feeling which result from the mechanism of the loom and the shuttle. Those primitive shepherds, however, whose history, as associated with the sheep, has been rapidly traced, were connected with Egypt. Abraham sojourned there; and the descendants of Jacob were captives in Egypt more than one hundred and fifty years. Modern historians have united in tracing the invention of weaving to the Egyptians,—the weaving not of wool, however, but of flax; and the fabric of the linen cloths in which some of the Egyptian mummies were wrapped has scarcely been excelled at the present day. Yet it may be questioned whether the claims of the nomadic shepherds have been fairly considered. The cultivation of the sheep was coeval with the expulsion from Paradise: the cultivation of flax must have been an improvement in husbandry of far later date. When the descendants of Noah were scattered, they pursued their old avocation,—their flocks and their herds accompanied them until they chanced to find some peculiarly fertile and convenient tract, which they gradually made their permanent abode; and then, building cities for themselves, they by degrees changed their way of life, and applied the arts, which they already possessed, to other and more extensive purposes.

The children of Mizraim, the offspring of Ham, found in Egypt a soil not well fitted for the prosperous management of the sheep. The Nile overflowed its banks twice in the year; and when its waters receded, a surface was left that was soon covered with luxuriant vegetation, but which infected and destroyed the sheep that fed upon it. Accident or experiment, however, soon proved that it was favourable to the cultivation of flax, and that from the fibres of the flax fine linen might be woven. Did the discovery of the flax lead to the invention of weaving, or was an art, known and practised for many a century before, directed to the manufacture of this new material? The latter is the more probable supposition, especially if it is recollected, that during the early period of the history of the Patriarchs, some associated tribes, that had previously inhabited the country to the east of Egypt, invaded and conquered the districts bordering on the Nile, and established a dynasty there under the appellation of the Shepherd Kings. The Abimelech, with whom Abraham had controversy, and who presented to him sheep, oxen, and slaves, was one of those shepherd kings.

To Egypt, then, let the honour still be yielded of having first woven the fibres of the stalk of the flax into linen; but the invention of weaving —the conversion into cloth of the animal fibres that grow on the back of the sheep—is a claim of yet more ancient date, and belongs either to those who wandered with their flocks far from the plains of Ararat, or who carried the customs and arts of their forefathers into the country which they subjugated.

THE EMPLOYMENT OF THE WOMEN.

The simplicity and small bulk of the loom enabled the female, whether in the tent of the wanderer or the settled residence of the citizen, to employ herself in the manufacture of clothing for her husband and her family.

A modern traveller thus describes the loom at present found among the Arab shepherds:—

"The Arab women use a very simple loom; it is called *nutou*, and consists of two short sticks, which are stuck into the ground at a certain distance according to the desired breadth of the *shauke*, or piece to be worked. A third stick is placed across over them; about four yards from them three sticks are placed in the same manner; and, over the two horizontal cross sticks, the woof (*sadouh*). To keep the upper and under woof at a proper distance from each other, a flat stick, called *mensebhk*, is placed between them. A piece of wood serves as the weaver's shuttle, and a short gazelle's horn is used in beating back the thread of the shuttle. The loom is placed before the *maharrem* or women's apartment, and worked by the mother and her daughters. The distaff (*maghezel el souf*) is in general use among the Aenezes. At Palmyra I saw several men using the distaff; and among the Kelby Arabs all the shepherds manufacture wool *."

From another traveller it appears, that even a perfect loom is not indispensable to the manufacture of woollen cloth! To this day, in Barbary, women are employed in the manufacture of their *hykes*, or blankets, who do not use the shuttle, but conduct every thread of the wool with their fingers †.

It may now be easily understood how Hannah provided the yearly little coat for her son Samuel. By a singular coincidence, as nearly as possible about the same time, but in other countries, Penelope is described as unravelling at night all that she had woven in the day; Helen, with all her faults, is found employed at the loom; and even Calypso and Circe are spoken of as busied in household duties of this kind ‡. Many centuries after this, the unfortunate Lucretia, when visited by Tarquin, was employed in carding and spinning wool with her domestics. Alexander the Great presented the ladies of the Court of Darius with some woollen cloth, the workmanship of his mother and sisters. It is true, that in his anxiety to treat his prisoners with courtesy, and at the same time to display the excellent qualities, as he supposed, of those who were dear to him, he forgot the debased character of the luxurious and enslaved people whom he had conquered, and gave offence by the homeliness of the present. Still later, however, and returning to the capital of the world, and in its state of greatest luxury, Augustus was not ashamed to boast that he wore the clothes which had been manufactured by his wife and sister and daughters. It will be seen, when the history of the sheep is traced down to the present day, that in every country and in every age, while simplicity of manners and the truest virtues of the female character were retained, such was the ordinary and chosen employment. "She maketh herself," says Solomon, "coverings of tapestry; her candle goeth not out by night. She layeth her hands to the spindle, and her hands hold the distaff §."

There is a passage in Virgil which affords a beautiful illustration of this description of the employment of the good wife; indeed, it bears so

* Notes on the Bedouins and Wahabites, by Lewis Burckhardt, p. 38.

† Shaw's Travels, p. 224.

‡ Homer's Iliad, iii. v. 25, and Odyss. ii. 94, and vi. 52.

§ See Theocrit. Idyll. 15.; Suetonius, Aug. 73.; and Fleury's History of the Israelites, p. 72. See also a Tract on Wool, by Mr. Wansey, somewhat erroneous in the principle which it advocates, but full of interesting information with regard to the history of wool.

great a resemblance to it, that it might almost pass for a poetical imitation.

> "Night was now sliding in her middle course:
> The first repose was finished: when the dame
> Who, by her distaff's slender art subsists,
> Wakes the spread embers and the sleeping fire.
> Night adding to her work, and calls her maids
> To their long tasks by lighted tapers urged *."

EMBROIDERY.

A passage in the book of Judges shows that the art of embroidery was not only known, but carried to great perfection, at an early period of the history of the tribes. The Israelites had done evil in the sight of the Lord, and were for twenty years oppressed by Jabin, one of the most powerful of the kings of Canaan. At length they rebelled, and Sisera, the captain or commander-in-chief of Jabin's troops, assembled a considerable army to quell the rebellion. Some time elapsed, and he returned not to his family, nor had any tidings of him reached them. His mother stood at one of the windows of her house anxiously looking out for him, while her wise ladies (her ladies in waiting) were trying to console her. Their argument is very characteristic. "Have they not sped?"—It is not possible that they could have failed. "Have they not divided the prey?"—Are they not now delayed by the division of the prey? "For every man a slave or two. To Sisera a prey of divers colours, a prey of divers colours of needlework, of divers colours of needlework on both sides meet for the necks of them that take the spoil †!"

It is singular that Homer, speaking of the Greeks seventy or eighty years after this, describes the progress of this art among them,—he speaks of the "painted garments" adorned with flowers and trees in beautiful colours. Pliny ‡ says, that after this the Phrygians, not far distant from Canaan, wrought these with needles. Still later they were interwoven with various coloured worsteds, and with gold thread; and at a more distant period, a beautiful kind of embroidery was made at Babylon, called, on account of its execution and value, "Babylonish Garments." It was the sight of one of these, amidst the spoils of Jericho, that tempted Achan, one hundred and sixty years before, to break the Divine command §. It further appears that only the higher class of persons were permitted to wear these Babylonish robes ||; which are, therefore, by anticipation, appropriated to Sisera as his share of the spoil. It is really pleasing to be able to collect these singularly accurate confirmations of the sacred history, and likewise to see the arts of various kinds flourishing among the Israelites and in their neighbourhood, at a time when they were perfectly in their infancy in those countries that were afterwards the especial residence of science and philosophy.

TITHES.

According to the Levitical law, sheep, as well as "all the seed of the land and the fruit of the tree," were tithed. In the last chapter of Leviticus, the method of separating the tenth is pointed out in somewhat obscure terms. "And concerning the tithes of the herd, or of the flock, even of whatsoever passeth under the rod, the tenth shall be holy (shall be devoted) unto the Lord. He shall not search whether it be good or bad, neither shall he

* Æneid, viii. v. 407,—Trappe's Translation.
† Judges v. 20. ‡ Lib. viii. c. 48. § Joshua vii. 21.
|| Burder's Oriental Customs, vol. ii. p. 88.

change it *." The explanation of this is curious and satisfactory. "The cattle were all brought into a sheep-cote, in which there was but one gate, and that so narrow as to suffer only one to come out at a time. The dams being placed without, and the gate opened, the young ones were invited by their bleating to pass out to them. As they passed by, one by one, a man who stood at the gate with a rod coloured with ochre, told them in order, and when the tenth came out he marked it with his rod as the tithe sheep †."

THE BREED OF BASHAN.

Whether there were different breeds of sheep, or different varieties of the same breed, cultivated for particular purposes, cannot be determined. Speaking, however, of benefits that had been conferred on the Israelites, Moses alludes to rams of the breed of Bashan as a peculiar and superior sort ‡. In other parts of scripture the bulls of Bashan § are mentioned. It was a district that fell to the lot of the tribes of Reuben and Gad, being part of the land of Gilead, and celebrated for its rich pasturage. Cattle and sheep probably sooner fattened there and grew to a larger size, but there is no reason to suppose that there was any other peculiarity in the breed.

THE MALE ONLY EATEN.

By comparing together various detached parts of scripture, some additional information may be obtained regarding the sheep, as contributing to the food of man. The history of the patriarchs, the regulations of the Mosaic ritual, and a few occurrences of later date, casually mentioned, prove that its flesh was eaten, yet not as ordinary food; it was reserved for occasions of peculiar festivity, or for the hospitable entertainment of the stranger. But the male only was, with few exceptions, destroyed; the Paschal lamb was a male—those offered in sacrifice were usually males—and Jacob, pleading the fidelity with which he had served Laban, protests, "the rams of thy flock have I not eaten ‖." When such a system was pursued, it will not be surprising that the flocks of the patriarchs were so numerous, and that those of the Arabs of the present day, who have nearly the same customs, are numerous too.

HOSPITALITY OF THE ARABS RESUMED.

Some facts, related in the continuation of the Old Testament history, give a more extended view of the hospitality of the shepherds. A lamb or kid was usually selected for the entertainment of the stranger. It was roasted or seethed in its own gravy, and often served whole; and that which remained after the feast, or a part of it, was given to the traveller to support him on his journey. When Gideon was summoned to become the deliverer of Israel, he mistook the heavenly messenger for a prophet, and with all the hospitality of his vocation and of the time in which he lived, "he made ready a kid and unleavened cakes of flour, and he put the flesh in a basket, and he put the broth in a pot, and brought it out unto him under the oak ¶." Harmer well observes that there is a passage in the narrative of a modern traveller that affords a perfect commentary on this. "Besides a bowl of milk and a basket of figs, raisins and dates, which were presented to us immediately on our arrival, the master of the tent where we lodged fetched us from his flock a kid, a goat, a lamb, or a sheep, according to the

* Lev. xxvii. 32, 33.
‡ Deut. xxxii. 15.
‖ Gen. xxxi. 38.
† Burder's Oriental Literature, vol. ii. p. 62.
§ Psal. xxii. 12.
¶ Judges vi. 19.

number of our party, half of which was seethed by his wife and served up, and the rest was made *kab-ab*,—this is cut into pieces, roasted, and preserved for our breakfast or dinner next day *. May we not suppose that Gideon, having presented some slight refreshment to the supposed prophet, killed a kid, seethed a part of it, and brought the stewed meat in a pot with unleavened cakes of bread, and the *kab-ab* in a basket, to be carried away with him in order to serve him for some after-repast on his journey ?†"

THE DELICACY OF THE LAMB.

When the primitive shepherds indulged themselves with animal food, the flesh of the lamb was considered as an especial dainty. Thus Amos speaks of those "who lie upon beds of ivory, and stretch themselves upon their couches, and eat the lambs of the flock, and the calves out of the midst of the stall ‡." Sir John Chardin, who travelled through Palestine and the neighbouring countries, says that "the lambs of this breed, with the accumulation of fat about the haunches, must be eaten in order to form a conception of the moisture, taste, and delicacy of this animal." Hence they were used as presents; Samson sent one to his father-in-law, and Jesse, when he brought his son David to Saul, made him the bearer of some bread, a bottle of wine, and a lamb. It is probably with reference to this delicacy that the Psalmist speaks of his soul being satisfied as with marrow and fatness §.

Particular parts of the lamb were considered as especial delicacies. When Samuel entertained Saul, the future king of Israel, "he brought him into the parlour, and made him sit in the chiefest place among them that were bidden, which were about thirty persons; and Samuel said unto the cook, Bring out the portion which I gave thee, of which I said unto thee, set it by thee; and the cook took up *the shoulder* and that which was upon it, and set it before Saul ||." The shoulder of the lamb, of the present breed, before the fat begins to accumulate about it, is no bad dish, although it would not now be selected as quite the favourite one. There is no disputing, however, about tastes. The reader will find a somewhat ludicrous, but a singularly satisfactory illustration of this passage in a note ¶.

The lamb or the kid was not, however, to be seethed in its mother's milk **. This was not because there appeared to be something revolting and unnatural in employing that with which the mother had nourished her young, in preparing it for the table, but because a superstition, derived from an idolatrous practice, was connected with this method of dressing the lamb. "It was a custom of the ancient heathens, when they had gathered in all their fruits, to take a kid and boil it in the dam's milk; and then, in a magical way, to go and besprinkle with it all their trees, fields, gardens, and orchards, thinking by this means they should make them bring forth more abundant fruit the following year. Wherefore God forbad his people, the Jews, at

* Shaw's Travels, p. 12.

† Harmer's Observations, vol. i. p. 330.

‡ Amos vi. 4.

§ Psal. lxiii. 5.

|| 1 Sam. ix. 22, 23, 24.

¶ "Abdomalek, the Califh, upon his entering Cufah, made a splendid entertainment. When he sat down, Amron, the son of Haroth, an ancient Mechzumean, came in. He called him unto him, and placing him by him upon his sofa, asked him what meat he liked best of all he had ever eaten. The old Mechzumeàn answered, an ass's neck well seasoned and well roasted. What say you, says Abdomalek, to a leg or shoulder of a sucking lamb well seasoned and well roasted, and covered over with butter and milk?"—Oakley's History of the Saracens, vol. ii., p. 277.

This perfectly explains why it was set apart for the future monarch, and it probably explains too what it was that was upon the shoulder.

** Exod. xxiii. 19.

the time of their ingathering to use any such superstitious or idolatrous rite *."

It was forbidden to eat any of the flesh (referring principally to sheep) that had been torn by wild beasts †. There might be two reasons for this, —the Jews were forbidden to eat of any animal that died with the blood in it, and there could be no security that the blood had been perfectly drained away when it was thus found dead. There might be another and not improbable reason,—all Palestine and Arabia abounded with wolves, foxes, and dogs. They are varieties of animals most of all subject to rabies. The sheep might have been worried by a rabid animal; some of the empoisoned saliva might remain about the wound or fleece, and, the carcase being carelessly handled, hydrophobia might be easily communicated.

CASTRATION.

One circumstance more may be hinted at before another part of the subject is taken into consideration. Mention has just been made of "calves out of the midst of the stall," and reference is elsewhere made to the ox and the stalled ox. It must not, however, be presumed that the castration of the bull-calf was practised in very early times; for it is the same Hebrew word that is translated indiscriminately ox ‡, ox at plough §, wild ox‖, bullock ¶, bull **, and cattle. It is a generic term: it means the male of the ox genus, or, in some places, and in the last quotation, the ox genus, without distinction of male or female. No word signifying the wether, or castrated sheep, is to be found in the whole of the scriptural history; but there are, however, passages in which it is forbidden to offer any except the perfect animal in sacrifice, and even human beings injured in or deprived of the testicles were forbidden to appear in the Temple. It is probable, therefore, that this method of increasing the tendency to fatness in the sheep, and effecting earlier maturity, and also, to a certain degree, improving the wool, was unknown to the Jews both in earlier and later times. Indeed it is not likely with regard to sheep, that, little as these animals were used for food, a practice should be resorted to, the principal influence of which would be to increase the propensity to fatten early. There is likewise no account of the sheep being stalled for this purpose.

EWE'S MILK USED AS FOOD.

It may now be proper to enter more fully into the consideration of the nutriment derived from the milk of sheep. It has been seen that, during the antediluvian age, it was thus alone that the sheep contributed to the food of man. The milk and the wool were the only products for which this animal was domesticated, and for which, in some parts of the world, he is even at the present day bred. In proportion, however, as agriculture has improved, the milk of the sheep has ceased to be an article of human sustenance, and has been appropriated to its natural purpose, the food of the lamb.

QUALITIES OF DIFFERENT MILKS.

Ewe's milk, when freshly drawn, has an appearance very similar to that of the cow, except that it often has a peculiar oiliness about it: it yields however a greater quantity of cream, and forms a very soft kind of butter. In a most learned and useful work on the general properties of milk, by

* Cudworth on the Lord's Supper, p. 14.
† Exod. xxii. 31. ‡ Exod. xxi. 28. § Deut. xxii. 10.
‖ Deut. xiv. 5. ¶ Num. xv. 11. ** Gen. xxxii. 15; Ps. L. 10.

Messrs. Parmentier and Desyeux, the following table is given of the comparative value of the milk of the domesticated animal, with reference to the several uses to which it may be converted :—

For Butter.	Cheese.	Sugar.	Whey.
The Sheep	Goat	Ass	Ass
— Cow	Sheep	Mare	Mare
— Goat	Cow	Cow	Cow
— Ass	Ass	Goat	Goat
— Mare	Mare	Sheep	Sheep

So that from equal quantities of milk the greatest produce of butter would be obtained from that of the ewe; of cheese from that of the goat; and of sugar from that of the ass: but, at the same time, the sheep is inferior to the goat only, and superior to the cow, in the production of cheese. If, however, ewe's milk excels that of the cow in the quantity of butter yielded, that butter is inferior in quality; it is less solid; it has an unpleasant oily taste, and it soon becomes rancid. On this account, probably, there are few places in which mention is made of ewe's butter as an article of food, and there is no recorded instance of its having been an article of commerce *.

CHEESE FROM EWE'S MILK.

Ewe's milk was used in the manufacture of cheese many centuries before there is any record of this article of human sustenance being derived from the milk of the cow. Ewe-milk cheese was often made in the early times on a large scale, and was a very material and valued article of food. Butter is frequently spoken of in the sacred scriptures, but it is the opinion of the best commentators that, during the first period of the Jewish history, the word so translated means the caseous and not the oleaginous product of milk. In one passage, where the mechanism described is too plain to be mistaken, the proper translation is given, and that in the most ancient book in the world, "Hast thou not poured me out like milk, and curdled me like cheese †." There is much reason to believe that this was the product of the sheep, for such was the cheese spoken of by other writers of a remote age; and the "butter of kine," mentioned in a later period of Jewish record, would seem to be a delicacy of rare occurrence, promised as the reward of obedience.

THE DAIRY OF POLYPHEMUS.

Homer, who flourished 900 years before the Christian æra, describes the cave of Polyphemus as it appeared to Ulysses and his companions. It is the earliest record of the process of making ewe-milk cheese and of sheep-management generally, and therefore it is given here at some length. Ulysses is speaking.

Around the grot we gaze, and all we view,
In order ranged, our admiration drew:
The bending shelves with loads of cheeses pressed,
The folded flocks each separate from the rest.
(The larger here, and there the lesser lambs,
The new-fall'n young here bleating for their dams,
The kid distinguished from the lambkin lies):
The cavern echoes with responsive cries.

The monster now approaches, bringing home the rest of the eyes.

Now driven before him through the arching rock
Come tumbling, heaps on heaps, the unnumber'd flock;
Big-udder'd ewes, and goats of female kind.
The males were penn'd in outward courts behind.

* Rees's Cyclopædia, Art. Milk. † Job x. 10.

Having driven them all into the cave, he closes the door, and commences his evening occupation.

> He next betakes him to his evening cares,
> And, sitting down, to milk his ewes prepares:
> Of half their udders eases first the dams,
> Then to the mother's teats submits the lambs.
> Half the white stream to hardening cheese he press'd,
> And high in wicker baskets heaped: the rest
> Reserved in bowls, supplied the mighty feast *.

Euripides and Theocritus speak of cheese, but never of butter. Aristotle gives several directions respecting the manufacture of cheese, but says nothing of butter: in fact it was not known to the early or even the later Greeks. St. Paul, in his Epistle to the Corinthians, speaks of the milk or the product of the milk of the ewes being eaten by the Greeks in his time,—"Who planteth a vineyard, and eateth not of the fruit thereof? or who feedeth a flock, and eateth not of the milk of the flock? †"

VIRGIL'S MANUFACTURE OF CHEESE.

Nearly 900 years after the time of Homer, Virgil speaks of circumstances connected with the manufacture of cheese from ewe's milk, but he says not a word of that which may be obtained from the milk of the cow.

> Some when the kids their dams too deeply drain,
> With gags and muzzles their soft mouths restrain.
> Their morning meal the peasants press at night,
> Their evening meal before the rising light.
> To market bear, or sparingly them steep
> With seasoning salt, and stored for winter keep ‡.

ARAB MANUFACTURE OF EWE-MILK BUTTER AND CHEESE.

Mr. Burckhardt gives the following account of the manufacture of butter from ewe's and goat's milk by the Syrian Arabs. "The sheep and goats are milked during the three spring months, morning and evening. They are sent out to pasture before sun-rise, while the lambs or kids remain in or near the camp. About ten o'clock the herd returns, and the lambs are allowed to satiate themselves, after which the ewes belonging to each tent are tied to a long cord, and milked one after another. When a ewe is feeble in health her milk is left wholly for the lamb. The same process occurs at sun-set. From a hundred ewes or goats (the milk of which is always mixed together) the Arabs expect, in common years, about eight lbs. of butter per day, or about seven cwt. in the three spring months. What the Arab's family does not use is sold to the peasants or town's people. The male lambs or kids are sold or slaughtered except two or three which the Arabs keep for breeding. In years of scarcity both sheep and goats prove altogether barren. The Aeneses shear their sheep once a-year near the end of spring. They usually sell the whole of the wool before the sheep are shorn, at so much per 100 sheep §."

Several travellers describe the same process among the Bedouins and Moors of Barbary, and which probably, as with regard to every thing else concerning them, does not differ much from the ancient custom. "Their method of making butter is by putting the milk or cream into a goat-skin, turned inside out, which they suspend from one side of the tent to the other,

* Pope's translation of the Odyssey, lib. ix.
† 1 Cor. ix. 7. ‡ Georg. III. Dryden's Translation.
§ Notes on the Bedouins, p. 114.

and then passing it to and fro in one uniform direction, they quickly occasion a separation of the unctuous and wheyey parts *."

"The butter of the Moors in the empire of Morocco, which is bad, is made by putting the milk into a skin, and shaking it until the butter separates from it †."

Hasselquist, speaking of an encampment of the Arabs, which he found not far from Tiberias, on the foot of the mountain or hill on which Christ preached his sermon, says, "They make butter in a leathern bag hung on three poles erected for the purpose in the form of a cone, and drawn to and fro by two women ‡."

In the Levant they tread upon the skins with their feet. Does this throw any light on a passage in Job, who, when speaking of his former prosperity, says, "I washed my steps with butter, and the rock poured me out rivers of oil §?" He or his servants were so constantly employed in manufacturing butter from the milk which his innumerable flocks yielded, that the rocks or broad stones on which the skins were placed, might be said to pour out rivers of oily matter, and their feet were washed in the semi-fluid butter, for it resembled a kind of concrete oil more than anything else.

There are few of the modern Arabs who, at the present day, use or know the value of the milk of the cow. To this purpose is the testimony of an intelligent traveller. "By the present Arabs the camel's milk is used to drink either alone or mixed with rice and flour, and either sweet or sour; the butter is made of goat or sheep's milk. It is put into a goat's skin, tied to one of the tent poles, and for one or two hours constantly moved backward and forward. The buttery substance then coagulates, the water is poured out, and the butter is put into another skin. If after two days they have collected a certain quantity of butter, they place it over the fire, throw in a handful of *burgoul* (wheat boiled with some leaven and then dried in the sun), and leave it to boil, skimming it carefully. After having boiled for some time, the bourgoul precipitates all the foreign substances, and the butter remains quite clear at the top. The bourgoul that has been thus used is eaten by the children. They seldom make any cheese, but other Arab tribes, and particularly those of Ohl-el-Shemál, manufacture much cheese and sell it to the other tribes ‖."

He adds that the Bedouins eat butter to excess. Whoever can afford such luxury swallows every morning a large cupful of butter before breakfast, and snuffs up as much as he can into his nostrils, while his whole food swims in butter ¶.

The quantity of butter yielded by the flock as reported by Burckhardt, viz. eight pounds a-day by a hundred ewes, or rather more than half a pound per day by each ewe, would scarcely repay the modern dairyman for his trouble and expense. It appears that, whether from the peculiarity of the breed, or faulty management, or the hardships to which the flocks were necessarily subjected by their frequent journeys and occasional deficiency

* Shaw's Travels, p. 168.

† Stewart's Journey to Maquinez.

‡ Hasselquist's Travels, p. 159. See also Burder's Oriental Customs, vol. i. p. 138, and Stewart's Travels, vol. ii. p. 35. § Job xxxix. 6.

‖ Burckhardt's Notes on the Bedouins, p. 35.—M. de Brisson, in his singular history of his captivity among the African Arabs, says, that "when the butter which is obtained from sheep and goats, and camel's milk mixed, is churned, they put it into small skins where it acquires a rancid smell, which, according to the taste of these barbarians, greatly enhances its value. The women use it in pomatum for their hair, and without this they would think something deficient in their dress."—p. 91.

¶ Burckhardt's Notes, p. 137.

of food, that neither the sheep nor the kine in former times were very productive of milk. There is a passage in Isaiah illustrative of this. The prophet is speaking of a time of extraordinary plenty, "and it shall come to pass in that day that a man shall nourish a young cow and two sheep, and it shall come to pass that from the abundance of milk that they shall give he shall eat butter*," he shall be able to indulge himself in this favourite luxury of the wandering shepherd. It would seem strange in modern times, if with a cow and two ewes producing milk, he were not able to do this in ordinary years.

The land of Canaan is, on account of its great fertility, spoken of as "flowing with milk and honey †:" and it is predicted of the Messiah by Isaiah, "butter and honey shall he eat ‡." D'Arvieux, being in the camp of the Grand Emir, who lived in much splendour and treated him with great hospitality, was entertained on the first morning with little loaves, honey, newly-churned butter, and cream more delicate than he had ever seen §. In another place he says, one of the principal articles with which the Arabs regale themselves at breakfast is new butter mingled with honey. He adds, that "although these do not seem to suit very well, experience teaches that it is no bad mixture, nor disagreeable in its taste if one is ever so little accustomed to it ‖."

MANUFACTURE OF EWE-MILK CHEESE IN BRITAIN.

Until a century or two ago, the manufacture of ewe-milk cheese was common in most parts of England. Mr. Culley says that it used to be a general practice through Northumberland to milk the ewes, after the lambs were weaned, for six, eight, or ten weeks; and from this milk great quantities of cheese were made, which sold for about 3*d.* per lb. when kept to three years old. It was exceedingly pungent, and on that account some persons preferred it to cheese made from the milk of the cow ¶.

In some parts of Wales, the ewes still continue to be milked. It used to be particularly the case in the lower part of Glamorganshire; the milk was mixed with that of the dairy, and made a palatable tart cheese **.

In Scotland it was the universal practice, and still remains so in some parts of the Highlands, nor will the memory of it be erased, nor the custom quite cease, while some of the beautiful poetry of these districts remains. The cheese is said to acquire sometimes a smoky flavour, but, where that is not found, it is acknowledged to have a rich taste, with a not unpleasant tartness. The editor of the Encyclopædia Edinensis says, that it digests more readily than that which has been made from cow's milk, but is less nutritive. He adds, that goat's milk is more easily digested, but is also less nourishing, than either ††.

* Isaiah vii. 21, 22.

† Joshua v. 6. It is a proverbial expression denoting plants. So Euripides, speaking of a fertile country, says, that "it flows with milk and wine and the nectar of bees." —Bacch. Eræ. v. 8.—So Ovid,

"New streams of milk, new streams of nectar flowed,
And from the oak the yellow honey dropped."

—Metamorph. I. v. 111. See also Homer's Iliad, IX. v. 141, and Burder's Oriental Literature, vol. i. p. 110.

‡ Isaiah vii. 15. § Voyage dans Palestine, p. 24.

‖ Voyage dans Palestine, p. 197; Harmer's Observations, vol. i. p. 291.

¶ Report of Northumberland. ** Lloyd and Turner's Report.

†† Brewster's Encyclopædia, Art. Cheese.—One of the best accounts of this system of ewe-milking in the north is contained in a 'Letter on Sheep-Husbandry in the North, by Mr. Herbert,' in that useful periodical the 'British Farmer's Magazine,' November, 1830. "It appears to have been the pretty general practice forty years ago, to milk the ewe flocks, and either make ewe cheese, or mix and churn it with that of the cows, and

In Ireland the practice is as common as in any part of Scotland, and there, probably from want of cleanliness, the milk has a sharper and more smoky taste.

OBJECTIONS TO THE SYSTEM OF EWE-MILKING.

The milking of the ewes and the manufacture of this kind of cheese has now deservedly got into disuse in all except a very few districts. Barnaby Googe was the first and almost the only one of the old agricultural writers who had sufficient good sense to perceive the absurdity and mischief of it, where good husbandry, in other respects, prevailed. His condemnation of it is short, but pithy. "In the mean time you must not deale with the milking of ewes, so shall you have them to beare the more wooll, and bring the more lambes*."

As for the old practice of commencing the ewe-milking before the lamb was weaned, and thus stealing a portion of the nutriment, rarely or never too abundant, which nature had designed for the young one, it is too absurd, as well as palpably injurious, to merit serious refutation. Now that the value of the wool and the flesh of the sheep is so much increased, it is received as a principle, admitting of no exception, that the lamb should be abundantly supplied with food. If the fleece is to be good, and especially if the animal is to be brought to quick maturity,—if these are now the acknowledged objects of sheep husbandry, the lamb must not be stinted and starved when young. "I don't know," said an experienced farmer to Mr. Marshall, who was asking him by what means he brought his young sheep to so high a state of condition, "I don't know,—they were lambed fat, and they have been fat ever since; though I believe that I have kept them as well as I could keep them†." It is an easy thing to keep young sheep in good condition when they have not been neglected at first; but exceedingly difficult, if they have been once *let down*, ever to make them fat again, or, indeed, scarcely worth keeping‡.

The Spaniards, with all their bad management in other respects, appear

some of the small farmers are said to follow it to this day. The milking, which was performed every morning and evening, chiefly by women and children, commenced the day after the lambs were taken from the ewes, and continued till about the middle of September, when the ewes were dried off and well fed preparatory to their receiving the ram. They are said to have yielded from a pint to a pint and three quarters, and some a quart per day. They were milked in little stalls made for the purpose, and are said to have set their legs with as much firmness as a gentle milch cow. Some of the milkers would milk twenty-five of them in an hour." Certainly this is the least objectionable mode of ewe-milking: the lambs, at least, were not stinted and starved.

* Barnaby Googe's Art and Trade of Husbandrie, p. 134.

† Marshall's Rur. Econ. Midl. Counties, vol. i. p. 326.

‡ A writer in the Farmer's Magazine for 1807, p. 434, gives a ludicrous account of this species of ewe-milking. "Care is taken to stint the lambs (this is indeed a very appropriate word, both as it regards their present nutriment and their future growth and value) by milking the ewes every evening before the lambs are admitted to them. This is a scene which I well remember to have witnessed more than 30 years ago, when a boy at school in Perthshire. The maids purposely delayed it until after sunset, that they might have the assistance of their sweethearts, the unmarried ploughmen, after they had pulled their stated number of back loads of thistles. The ewes were driven in a body into a *bught* (or small fold), whence they were taken one by one as wanted to be milked. It was then that the swain's assistance was of use. He dragged the reluctant ewe from the bught, and held her by the horns, while the maid going behind her, abstracted perhaps two or three gills from her udder. Although a few minutes were usually sufficient for doing this, yet it was seldom performed without something else being added by the ewe to the contents of the pail. Although much of this was skimmed off by the damsel with her fingers, yet, together with the yolk and grease from her hands, might it not somewhat contribute to impart that aromatic, pungent taste, by which ewe-milk cheese then was, and now is, distinguished?"

to be fully aware of the necessity of keeping the lamb well, in order to insure a fine and plentiful fleece. Every lamb in the migrating flocks has, besides his natural mother, a foster one; and for this purpose a sufficient number, or probably half of the lambs, are quickly weaned and destroyed.

As for the milking after the weaning of the lambs, there is not so much inconvenience or mischief from the struggles of the ewe, for she feels relieved by the occasional abstraction of the milk with which her udder is overloaded, and soon begins to submit to the operation with tolerable quietness: but there are still insuperable objections to the practice. The lamb must be weaned early in the season, or little profit will be derived from the milk of the ewe; and for the sake of this early weaning, the time of lambing must be contrived to be as early as possible,—in the depth of winter, or before the winter has scarcely passed,—and then, some of the ewes, and more of the lambs, will perish by cold. The lamb must also be taken from the mother at a time when her milk is necessary to him: when he has not yet learned, or has not sufficient strength to obtain nourishment enough from other sources for the full development of his form and distinguishing qualities; and more will ultimately be lost by his diminished value, or by the expense afterwards incurred to get him into saleable condition, than many times the quantity of milk obtained from the dam would repay. The mischief, however, is not confined to the lambs, for when this drain on the mother is protracted beyond the period that nature designs, some other produce that she was intended to yield, and probably a more profitable one, must be proportionably diminished. That which should have increased the weight of the fleece, or of the carcase, or given her a disposition to improve, or brought her regularly and effectually into season for impregnation, or given her strength to yean a full-grown and healthy lamb, has been gradually abstracted in the milk. It used to be observed, even at the time when this practice was most common, that he who followed it up too closely was sure to have fewer lambs, and smaller, and leaner, and eventually of less value; his cast ewes were more out of condition, and more difficult to be prepared for the butcher; and, in the following spring, he had far more barren ewes than his neighbour, who either did not pursue this system to so great an extent, or did not pursue it at all *.

Mr. W. Hogg, when treating on the Flesh-fly or Maggot in Sheep, has an observation that deserves more attention than has been paid to it. He had been saying that a peculiar fetid smell accompanied not only diarrhœa, but the discharge of healthy fæces; that this lodged among the wool above the anus and round the root of the tail, and that it was within the influence of this odour that the fly always deposited its eggs at the beginning of its appearance. He adds, "nothing can be more dangerous than for the ewe-milker to lay hold of the wool with her wet hand, which she is often obliged to do for the purpose of keeping the ewe steady above the pail †." At the close of the season the flies attack the sheep with greater fury, and alight on any part that appears to be fit for their purpose; but the time of mischief is then short,—whereas the ewe-milker, by placing her hand wet, and impregnated with the odour proceeding from the flanks and udders and tail of the animal on various other parts of him, hastens the period of mischief, and probably increases it tenfold.

* Little on Mountain Sheep, p. 64.

† Prize Essays and Transactions of the Highland Society, vol. i. p. 328.

THE CIRCUMSTANCES UNDER WHICH IT MAY BE ALLOWED.

At weaning time, however, the ewes are occasionally inconvenienced by the fulness of the udder,—local inflammation—the same disease that would be called garget in the cow—ensues: there is enlargement of the udder or of one of the teats, or serious and spreading ulceration of the udder generally. To prevent this, Mr. Parkinson, having kept the ewes for a day and a night after the lambs were taken from them, has them all milked, and a good cheese made of the milk. He adds, "before I adopted this practice, the bag often festered, and some of them had the garget, and lost part of the udder—one pap, or even both. In two days after I had the ewes got up again, and a part of the milk drawn from those that appeared to have too much. Some few of the ewes may want milking a third, or even a fourth time. This method has a great tendency to make the ewes fatten quicker: for, when their udders are full of milk, and it is not drawn, it causes them great pain; and at times destroys the constitution of a good ewe, as the best nurses are the most frequently full of milk *." This may be advisable with regard to the ewes whose udders are really inflamed, or with regard to all, if garget seems to be spreading among the flock, or there appears to be a general tendency to inflammation among them; but, as a usual practice at weaning time, it is scarcely to be recommended. As to the cheese, few would make it, and fewer still would be disposed to eat it, if there were much disease of the udder.

THE CUSTOM IN ICELAND.

In some other countries the system of ewe-milking is pursued to a more absurd and injurious extent. The ewes are milked every night; and not satisfied with what has been obtained at the first milking, every ewe is caught a second time, and the little which she had kept back for her young one, and which, after her first liberation, she had suffered to descend into the bag, is drawn from her. What is to become of the lamb that is afterwards to toil in vain for nourishment,—or of the ewe, whose strength and constitution are nightly so taxed to provide a small and inadequate portion of milk for her young one,—does not enter into their calculation. When such a practice is pursued, it is no wonder that the Icelandic sheep are diminutive in size; and that their fine wool is mixed with so much that is coarse and almost worthless †.

FRENCH EWE-MILK CHEESE.

The French seem to adhere as obstinately as any far less civilized people to this antiquated system of sheep husbandry. Ewe-milk cheese is become so much an article of profitable commerce, that the manufacture of it will not soon be relinquished.

A kind of cheese in high request, called the Sassenage cheese, is made of the milk of cows, sheep and goats, mixed together.

In the department of Les Basses Pyrénées, a considerable quantity, said to be peculiarly well-flavoured, is manufactured from ewes' milk alone; but for this purpose the lambs are weaned as early as March: they are, however, generally dropped before Christmas.

The little cheeses in the neighbourhood of Montpelier are made entirely of ewe's milk, stolen from them during the latter period of their

* Parkinson on Live Stock, vol. i. p. 293.
† Hooker's Tour in Iceland, p. 144.

suckling their lambs. The little ones are separated from their mothers every night, and do not return to them until the noon of the following day, after the ewes have been milked on their return from pasture. This is cruel work, and would be highly injudicious management too, if the system of husbandry or the habits of the country permitted the farmer to calculate on any tolerable profit either on the wool or the carcase of his sheep. A flock of four hundred ewes will give six or seven dozen of these cheeses every day until the beginning of June, when they are no longer milked,—as well because *they may not be too much weakened*, as that they may be ready for breeding early in the autumn.

The most celebrated of these productions is the Rochfort cheese, with an account of which this history of ewe's milk shall conclude. It is either made of pure ewe's milk, or by some persons a portion of goat's milk is added. The sheep are pastured all the year on the barren mountains in the neighbourhood, and no peculiarity attends the management of them, except that a considerable quantity of salt is given, which is supposed to impart a certain quality to their milk, but the real effect of which probably is to increase partly their appetite and more their thirst, and thus dispose them to yield a greater quantity of milk. The curdling of the milk is effected in the usual manner, especial care being taken that the rennet has not contracted any unpleasant flavour or smell. When the product has been properly pressed, it is carried to the cheese-room and placed on boards to dry, and, in order to prevent it from cracking, it is tightly bound in a large cloth.

Having become tolerably dry, it is carried to the *caves*,* where, on two successive mornings, it is sprinkled on both sides with fine salt. It is then rubbed with a coarse cloth, and on the following day well scraped with a knife. The parings are made into a round cheese, and consumed in the neighbourhood. Eight or ten of the cheeses are then piled on each other, and left for fifteen days; at the end of which time they are covered with mouldiness six inches in length. This is scraped off, and the cheeses ranged on the shelves as before. At the expiration of another fifteen days they are again cleaned from the mould, and this is repeated for two months, or until the cheeses gradually change from a white to a green and red colour, with blue or green veins running through the whole of their substance. The loss which takes places in all these manipulations is so great, that 100 lbs. of milk will not yield more than 20 lbs. of cheese.

The butter which is procured from the cream of this milk is said to be finely flavoured; but, like all other butter from ewe's milk, it is semi-fluid, and is sold under the name of Rochfort cream †.

* In the middle of Rochfort there is a deep valley, terminating in a cul-de-sac, and surrounded by a range of narrow peaked rocks, hollowed into numerous caverns. The rays of the sun do not penetrate into this valley more than a few hours during the longest days of summer. On the sides of these caves shelves are constructed for the cheeses. In different parts of the rock there are certain clefts or cracks, through which a cold wind blows sufficiently strong to extinguish a candle if brought within three feet of them. It is to the coldness of this wind that the property which these caves possess of bringing the Rochfort cheese to so much perfection is justly attributed. There is a considerable difference in the temperature of these caves, according to the degree in which this wind finds its way into and through them. M. Mascorelle found that the temperature of these caves was 16 degrees (Fah.) below that of the external air when he examined them in October. M. Le Sage, in the month of September in a certain year, found that in seven or eight of the caves the air was 15 degrees, and in two others it was 20 degrees colder than without. It is not often that nature presents these advantages for such a purpose, and it would be with much difficulty that they could be obtained artificially.

† Encycl. Méthod., art. Fromage.

Chapter III.

The Structure of the Skin—Value of the Pelt—Anatomy of the Wool—Difference between Wool and Hair—The first Sheep probably hairy—Gradual change from Hair to Wool—The Yolk—The form of the fibre—The supposed cause of Felting—Microscopic appearance of Hair and Wool—The Discovery of the irregular surface of the Wool—The different appearance of Hair—The properties of Wool—Fineness—The Wool-stapler—The influence of temperature—Pasture—Trueness—Soundness—Softness—The influence of the Yolk, Smearing, Clothing, Soil on this—Elasticity—Colour—The Felting property resumed—The various theories respecting it—Dependent on the curved form and serrated edge of the Wool—Illustrations of it—The different structure of different Wools as relating to Felting—The divisions of Wool—Long—Middle—Short—The operations of Carding and Combing.*

In order that the peculiar qualities and relative value of the different breeds of sheep may be duly estimated, when more precise descriptions of that animal begin to be found in the records of various countries, and in the narrations of travellers and the works of agriculturists, it will be advantageous to devote a few pages to the consideration of the structure, and varieties, and uses of wool; and especially as, during too long a period, the importance of the sheep, as contributing to human sustenance, was not fairly appreciated, but the attention of the sheep-master was principally and almost exclusively directed to the fleece.

THE STRUCTURE OF THE SKIN.

The skin of the sheep, and of animals generally, is composed of three textures. Externally is the *cuticle*, or *scarf-skin*, which is thin, tough, devoid of feeling, and pierced by innumerable minute holes through which pass the fibres of the wool and the insensible perspiration. It seems to be of a scaly texture; but this is not so evident in the sheep as in many other animals, on account of a peculiar substance, the yolk, which is placed on it, to nourish and protect the roots of the wool. It is, however, plainly enough to be seen in the scab, and other cutaneous eruptions to which the sheep is liable.

Below this is the *rete mucosum*, a soft structure; its fibres having scarcely more consistence than mucilage, and being with great difficulty separated from the skin beneath. This seems to be placed as a defence to the terminations of the blood-vessels and nerves of the skin, and these are, in a manner, enveloped and covered by it. The colour of the skin, and probably that of the hair or wool also, is determined by the rete mucosum; or, at least, the hair and wool are of the same colour as this substance.

Beneath is the *cutis*, or *true skin*, composed of innumerable minute fibres crossing each other in every direction; highly elastic, in order to fit closely to the parts beneath, and to yield to the various motions of the body; and

* The author begs to acknowledge the great assistance he has received in the composition of this chapter. He particularly refers to Messrs. Hubbard and Goodman of Leeds, and to an unknown but valuable correspondent at Bradford. To Mr. Thomas Plint, also, of Leeds, he is under obligations which he shall never forget.

After all, however, an author has his own views, and will pursue his own course; and he must abide the consequence. Whatever is confirmed by the experience of the sheep-breeder and the manufacturer, or, in spite of themselves, overturns their long-cherished prejudices and errors, they may divide as they please among him and his friends—that which will not bear the test of examination and experience, let them place to the author's score.

dense and firm in its structure, that it may resist external injury. Blood-vessels and nerves, countless in number, pierce it, and appear on its surface under the form of *papillæ*, or minute eminences, while, through thousands of little orifices, the exhalant absorbents pour out the superfluous or redundant fluid. The true skin is composed principally or almost entirely of gelatine, so that, although it may be dissolved by long-continued boiling, it is insoluble in water at the common temperature. This organization seems to have been given to it, not only for the sake of its preservation while on the living animal, but that it may afterwards become useful to man.

The substance of the hide combines with the tanning principle, and is converted into leather.

The skin of the sheep seldom undergoes the full process of tanning, but it is prepared in a peculiar way, and used as a commoner sort of binding for books, or it is manufactured into parchment, and thus on account of its durable nature, becomes most valuable, as connected with the disposal and security of our property. Some of the foreign lambskins are much sought after, as a species of ornamental clothing, as well as on account of their comfort and warmth, and are prepared with the wool remaining on them.

THE VALUE OF THE PELT.

The inhabitants of the Ukraine and Podoli, as soon as the lamb is dropped (which comes into the world with a pretty wavy skin, even without the assistance of art), sew it up in a sort of coarse linen shirt, so as to keep up a constant gentle pressure on the wool, pouring warm water over it every day, in order to make it soft and sleek. They slacken the bandage a little from time to time, as the animal increases in size, but still keep it tight enough to lay the wool in beautiful glossy ringlets, and thereby produce a delicate skin in great request in other countries for lining clothes and morning gowns. By this process the fine soft wool of the young lamb takes a beautiful arrangement; and the animal is killed younger or older according to the material intended to be produced, whether with a short glossy nap, like satin, fit only for delicate linings, or a warm thick fur for winter clothing *.

The Boucharian Tartars carry this refinement to a greater extent. They will not kill the female, for they look to her for the continuance of their flocks; but a great number of the male lambs are destroyed as soon as they are dropped. The wavy curls of these fleeces are sometimes remarkably beautiful, the richest damask scarcely exceeding them. They are of a black, blue, or silver-grey colour; the first of which, when thoroughly glossy, are most highly esteemed.

In some districts these fine and valuable furs—they partake more of the nature and appearance of fur than of wool—are produced by other means: the mother is slaughtered a little before her time of pregnancy would have expired, and the little one taken from the womb and destroyed while the carcase is still reeking. The short glossy fur, lying close to the pelt, is said to be more beautiful than any that could have been obtained from the same animal after birth †.

Bell, in his Travels in Russia in 1750, gives a similar account:—"At Astrachan they have great quantities of lamb-skins, grey and black, and some waved, others curled, all natural and very pretty, having a fine gloss, particularly the waved, which at a distance appear like the richest watered tabby. They are much esteemed, and are extensively used for the lining of coats and the turning up of caps in Russia and Persia and other parts. The

* Dr. Anderson on the Russian and Tartarian Sheep, p. 20. † Ibid. p. 51.

best of these are brought from Boucharia, Chiva, and the countries adjacent, and are taken out of the ewe's belly after she has been killed, or the lamb is killed directly after it is lambed; for such a skin is equal in value to the sheep. The Kalmucks and other Tartars, who inhabit the desert in the neighbourhood of Astrachan, have also lamb-skins, which are applied to the same purposes; but the wool of these being rougher and more hairy, they are far inferior to those of Boucharia or Chiva, both in gloss and beauty, as also in dressing, and consequently in value: I have known one single lamb-skin of Boucharia sold for five or six shillings sterling, when one of these would not yield two shillings."

Professor M'Culloch says that the value of lamb-skins varies according to the fineness, brilliancy, and colour of the wool. Black lamb-skins are more generally esteemed than those of any other colour. Some English lamb-skins, perfectly fine and white, and taken from the Anglo-Merino breed, are in considerable estimation. The greater part, however, come from abroad, and the importation of them is immense, having amounted on an average of 1831 and 1832, to 2,365,635, four-fifths of which were supplied by Italy. They are mostly used in the manufacture of gloves, 120 skins producing, on the average, 18 dozen pairs of gloves*.

On the skin of most animals, and intended somewhat for ornament, and the better distinction of species, but more for the warmth and comfort of the individual, is placed a covering of feathers, fur, hair, or wool. They are all essentially the same in composition. They are made up of an animal substance resembling coagulated albumen; an oily matter of various hues, according to the colour of the feather or the hair; and sulphur, silica, carbonate and phosphate of lime, and oxides of iron and manganese †.

The growth of the feather is different from that of the hair or wool. A small hollow cone first protrudes—the germ of the future quill; it increases in length and in bulk for a certain time, and then it opens at the apex, and the shaft of the feather pushes forward, with the filaments on either side of it; and these gradually unfold themselves and increase in size, yet rarely in number, until the feather is perfectly formed. The hair emerges from the skin of the same substance and bulk that it will ever be, and it increases in length only by the protrusion of fresh portions which push the others before them ‡.

ANATOMY OF THE WOOL.

In the fatty and cellular substance immediately beneath the cutis or true skin—some say imbedded in the true skin—there are numerous minute vascular bulbs. They arise from the cellular texture, and penetrate into the true skin; they consist of a double membrane, the outer one of which stops at the pore, or minute aperture in the skin, and between the two membranes a vascular texture has been traced. From the interior and centre of the inner membrane there proceeds a minute eminence, or papilla, which, surrounded by the membrane, projects into and through the cutis, while numerous fine filaments unite to form or to surround a seeming pro-

* M'Culloch's Dictionary, art. Gloves, Lambs, Sheep, Skins.

† Henry's Chemistry, vol. ii. p. 487.

‡ Dr. Anderson well illustrates this by a circumstance that is familiar to every shepherd: "About the month of November," says he, "most of the farmers in the south of Scotland cover the whole surface of the body of their sheep with a composition of tar and butter in certain proportions. This makes a black mark, which remains quite perceptible as long as the wool remains upon the sheep: but this mark gradually rises from the skin as the wool grows, so that at shearing time it is found to be nearly in the middle, the under part of the wool which had grown during the winter and spring being of a pure white below this black ring."—Anderson on Sheep, p. 115.

longation of the original papilla. In this way it gradually penetrates the cutis, and the rete mucosum, from which, as has been already observed, it takes its colour, and then, either pushing its way through the cuticle, the displaced portion of which falls off in the form of scurf, or carrying a part of the cuticle with it as a kind of sheath, it appears under the form and character of hair.

Whether it is a perfectly solid body, as some, describing its appearance when subjected to the power of the microscope, have affirmed *, or whether it consists of a hard exterior tube with a medulla or pith within †, has not been demonstratively proved. It is extremely difficult so to bring the hair under the power of a lens with a focus on not more than one-twentieth or one-thirtieth of an inch, as to obtain a knowledge of its internal structure. Those who are most accustomed to the use of the microscope are scarcely yet agreed as to the external form of the hair. That which is confidently affirmed of it by some, and which would beautifully explain several phenomena attending it, is as confidently denied by others. It will not, then, occasion much surprise if difference of opinion exists as to its internal conformation‡.

The fibrous structure of the hair is sufficiently evident: the gossamer filaments of the albuminous gluey substance within the inner membrane at the root have been seen converging in order to form the stump; and when the hair or wool has been diseased or decaying, or dead, it has been observed to split into numerous fibres at its point §. In this it bears an

* Hooke's Micrographia, vol. iii. fig. 2; Young's Nat. Phil., vol. ii. p. 190.

† Leuwenhoeck in Phil. Trans.

‡ It is amusing to compare the different testimony on this point given by those who have observed the hair, assisted by the most powerful lenses, who were skilled in the use of the instrument, and who could have no intention to deceive. Leuwenhoeck and Hooke published their microscopical observations about the same time. "The whole hair," says the first of these philosophers, "consists of little strings, whereof there were about a thousand in one hair, fewer or more, according to the thickness of the hair. Whether these strings are hollow, like so many pipes or vessels, I cannot possibly say; but it seemeth to me that they are, so that I conceive we may not unfitly compare the clods of the hair," (he had been speaking of irregularities on the surface of the hair,) "consisting of the aforesaid irregular particles, to the bark of a tree, and the little strings which compose that part of the hair within the clods, to the pipes which make the wood. In larger hairs, as the bristles of a hog, these hairs appear to be hollow. The whole root, except the cuticle, consists of little strings, which I suppose to be veins or vessels; and I have shown the root of a hair with all its fibres so plainly, as if before our eyes we had seen lying a common tree with all its roots, except that these fibres in the root of a hair were all of one thickness."—Philosophical Transactions, 1678, vol. xii. p. 1004.

On the contrary, Hooke gives the following account of the hair:—"They," the hairs of his head, "were for the most part cylindrical. Some of them were somewhat prismatical, but generally they were nearly round; they were all along, from end to end, transparent, although not very clear; the end nearest the root appearing like a black transparent piece of horn. The roots of the horn were smooth, tapering inwards almost like a parsnip; but I could not find that it had any filaments or any vessels like the fibres of a plant. The top, when split, which is common in long hairs, appeared like the end of a stick beaten until it be all frittered, there being sometimes half a score splinters or more. They were all, so far as I was able to find, solid cylindrical bodies, not pervious, like a cane or bulrush; nor could I find that they had any pith, or distinction of rind or the like, as I have observed in horses' hair, deer's hair, and the bristles of a cat. Even the bristle of a hog was a large transparent, horny substance, without the least appearance of pores or holes in it. Although I caused the light to fall in all the various ways I could think of, or that was likely to make the pores appear, if there had been any, I was not able to discover any; those parts that appeared to be pores in one position of the light, I could find a manifest reflection to be cast from them in another."—Micrographia, p. 156.

§ Bakewell's remarks on this point of the anatomy of the hair deserve to be quoted. "Hair is frequently observed to split at its points into distinct fibres—a division has also sometimes been seen in the hair of wool. This seems to prove that they are formed of distinct long filaments uniting in one thread or hair. In large hairs I have discerned

evident analogy to the structure of the nail of the human being, the hoof of the horse, and the horn of the bullock.

Like them it is vascular; although it grows as they do, principally by additions from the root, it is capable of deriving nourishment from vessels belonging to its pulp, which seem to accompany it to a considerable distance from the root, if not through its whole extent. The Plica Polonica, a disease whose existence is doubted by some, but of the occasional occurrence of which there is abundant testimony, completely establishes the vascularity of the hair; for it is an enlargement of the bulk of the hair itself: an enlargement of the individual hairs, so much so, as, in some cases, to permit the passage of red blood, for the hair will bleed when divided by the scissors *.

The staunchest advocate for the solidity of the hair of the human being, and whose observations have just been quoted in a note, acknowledges that in the hair of the horse and the deer he could trace a plain distinction of rind and pulp; he also has seen the fibres of which the general substance of the hair was made up. Bakewell has divided a hair into numerous fibres; Leuwenhoeck believed that he had seen hollows in these fibres, proving them to be tubes and vessels. The weight of evidence clearly favours the supposition that it consists of an external rind or tube, and an internal pulp or collection of fibres: the pulp or pith being found in its young state, or near the root; and the fibres, like those of a tree, or the branch of a tree, occupying and forming the substance of the hair. The hair however possesses the principle of vitality to a very slight extent; it is formed of those materials which are comparatively little subject to decomposition, and therefore it will preserve its form and properties for a long and indefinite period †.

WOOL-BEARING ANIMALS.

Authors have seemed to imagine that the production of wool was confined to the sheep; practical men, however, know that there is a numerous list of animals on whom, at some season of the year at least, wool is found. It used to be considered as one distinction between the goat and the sheep that the former was covered with hair and the latter principally with wool. The under hair of some goats, however, is not only finer than the fleece of any sheep, but it occasionally has the crisped appearance of wool. It is, in fact, wool—of different qualities in different breeds; in some rivalling or excelling that of the sheep, but in others so coarse as to be of use for the lists and edges of cloth alone.

On many of the undomesticated species of deer a portion of wool is found at the roots of the hair. It is so in the moose-deer, or elk, although not in any great quantities; on the wapiti deer it forms a thick covering; and it is plainly perceptible on some parts of the hide of the British red deer in the winter months; on the fallow deer it is more abundant; on the axis deer it has not been detected.

On some foreign breeds of oxen, as the yak of Tartary and the ox of

a number of divisions from the root to the point. In one hair I distinctly perceived fifteen of these divisions or fibres lying parallel to each other, and in some of the fibres a further subdivision was distinguishable. Probably these subdivisions were each composed of others still smaller, which the limited power of our instruments may prevent us from discovering. If such be the structure of the hair of some animals, it is at least probable that the hair of all others may have a similar conformation, although the fibres of which they are composed may be too minute, or adhere too firmly together to permit us to separate or distinguish them."—Bakewell of Wakefield, Observations on Wool, p. 125.

* Good's Study of Nature, vol. v. p. 678. † Bostock's Physiology, vol. i. p. 50.

Hudson's Bay, some fine and valuable wool is produced; on the Brahmin bull and cow it is sought for in vain.

The gnoo, a species of intermediate genus between the antelope and the ox, has, mixed with and filling up the interstices between the hair, a considerable quantity of wool, which is cast off in large masses in the spring. This is particularly observable in the pair of gnoos belonging to the Zoological Society of London.

The camel has, at the base of its long hair, a quantity of wool, which, if he were bred and multiplied in the British dominions, would be converted to useful purposes.

Many fur-clad animals bear upon them a variable quantity of wool. The hare, the rabbit, and the beaver, as will hereafter be more distinctly shown, are illustrations of this.

Nor is this mixture of hair and wool confined to the herbivorous animals; the most cursory examination will show it in the sable and the polecat. Some shorter, softer, wavy hair, interlacing with the neighbouring fibres, was found about the mane of a lion bred in confinement, and also on the neck of a tiger; probably extending over the whole of the frame of these animals when, in their native forests, and exposed to varying seasons, they need this double coating. This, perhaps, must not be called wool; but the author discovered, with mingled surprise and pleasure, a considerable quantity of true wool at the base of the external covering of an Italian wolf-dog. Its spiral curls were too distinct and numerous to be for a moment mistaken; and, very soon afterwards, he obtained from a Newfoundland dog, recently imported, and on a bear from Prince Edward's Island, a plentiful under-layer of wool, of the structure and felting properties of which delineations will be given. On the spaniel, the pointer, the hound, the greyhound, and the short-haired terrier, he sought for it in vain, but on one of the Isle of Skye terriers a small quantity was found.

"My opinion," says Mr. Plint, "the result of much thought, is, that with few exceptions, the covering of quadrupeds is a mixture of hair and wool, varying greatly in their proportions to each other. Let us consider them in their native state. They are exposed to the vicissitudes of the seasons, and therefore need a covering at one time to throw off the direct influence of the sun's rays, and at another time to retain the animal warmth, when the surrounding temperature would otherwise rapidly withdraw it. Hair and wool are bad conductors of heat, and admirably adapted for both purposes, and they exist in actual and in relative quantity according to the altered situation and wants of the animal. Thus, in summer, the fleece of the arctic hare is thin, as I believe is that of the argali; in winter, a fine wool fills up the interstices between the hair, and protects the animal from the inclemency of the weather. Here is an admirable provision for the wants of animals generally; but we should stop short of the exact adaptation of the fleece to these wants, if we did not remark how necessary it is that the wool, so indispensable to the retention of the warmth of the animal, should be protected by a coat of long smooth hair. Just imagine the argali or the hare, or, to instance animals of the carnivorous genus, the sable or the polecat, clothed with wool only, and what a miserable plight the poor animal would soon be in!—the fleece a constant impediment to its movements among underwood, if indeed it were not entirely stripped off the back of the animal." There is a great deal of the true philosophy of zoology in these remarks; and what a boundless field for future investigation, the employment of human industry, and the extension of commerce and national wealth is here opened!

THE EXTERNAL COAT OF THE FIRST SHEEP PROBABLY HAIRY.

From what has been stated of the mixture of hair and wool in the coat of most animals, and the relative situation of these materials, it will not appear improbable that such was the character of the fleece of the primitive sheep. There are, at the present day, varieties of this animal occupying extensive districts that are clothed outwardly with hair of different degrees of fineness and sleekness; and underneath the external coat is a softer and shorter and closer one, that answers to the description of fur according to most travellers, but which really possesses all the characters of wool. In a very considerable proportion of Tartary the sheep are covered with a sleek and silky hair; the flocks of the Boucharian Tartars are all of this character. In the eastern districts of India, in several parts of China, and in many of the regions of Africa, the pelt is protected by hair of a longer, coarser, and more shaggy kind *.

"In the Sahara desert of Africa the sheep are commonly of the height of a doe, and covered with hair like that of a dog; and the Abbé Demanent asserts in his new history of Africa, published at Paris in 1787, that two varieties of sheep are reared in Guinea, one of which is covered with wool, and has a long fat tail, (the fat probably accidental,) while the other is larger, stronger, and covered with shaggy hair, like a goat †."

Dr. Anderson says that he had an opportunity of seeing a night-gown lined with the Boucharian lamb-skin fur, described in page 53, and which, says he, "I find consists of nothing else but hair, without the smallest intermixture of wool ‡."

Sir Joseph Banks once imported three sheep from Spain, "which were sleek and smooth as a horse, and never, in any season," according to the representation of this eminent naturalist, "showed the least signs of wool or down in the most minute quantity §."

Mr. Flint first led the author to doubt the perfect accuracy of these accounts. The careless and superficial manner in which travellers have examined and described the sheep of the countries they visited is well known. These useful animals have scarcely been deemed worthy the tourist's notice; and even the naturalist has not dreamed of finding in this poor beast, common to every country, any thing worthy of record. In addition to this it may be stated, that the naturalist had rarely a definite conception of the difference between hair, and fur, and wool, or of the extent to which they mingled in the covering of almost every animal. It is therefore highly improbable that the sheep, which is now become, by cultivation, in some countries, *par excellence*, *the wool-bearing animal*, should, in any country, or at any time, have been perfectly destitute of it. Sheep of almost every known variety have occasionally been inmates of the Gardens of the Zoological Society, but there has not been one on which a portion of crisped wool, although occasionally exceedingly small, has not been found at the bottom of the hair ‖.

* Luccock on Wool.

† Anderson on Sheep, p. 18.

‡ Bath Society Papers, vol. viii. p. 11.

§ Ibid. p. 12. Dr. Anderson says in another publication, "Last summer a Danish East Indiaman put into Leith Roads on her return home. I went on board to see what curiosities she had, and I there found a very fine sheep, which was covered with a close coat of thick short hair, very smooth and sleek, like the coat of a well-dressed horse, but the hairs rather stiffer, and thicker set on the skin, the colour a fine nut-brown. I was told that it was brought from the island of Madagascar, and that all the sheep found in the island were of the same sort."—American Philosophical Transactions, vol. iv. p. 149.

‖ An argali died at the Gardens of the Society a little while ago, and the author, being then confined by illness, requested a very intelligent and observant friend to examine the proportion of wool which grew among the hair. He reported that there was

In all the regions over which the patriarchs wandered, and extending northward through the greater part of Europe and Asia, the sheep is externally covered with hair, but underneath is a fine short downy wool, from which the hair is easily separated. This is the case with the sheep at the Cape of Good Hope, and also in South America.

In the volume of the American Philosophical Transactions just quoted, the Jamaica sheep is thus described:—"The Jamaica sheep forms a distinct variety, altogether different from any other I have ever seen. The hair is a substance *sui generis*, and is as different from the kemp and stichet hair of Europe as from the long tough hair of the Russians and other hairy breeds. The wool, too, is as different from that of other sheep-wool as the hair; it is finer than any other, not excepting the Shetland breed, although I should suspect that it is scarcely so soft *." It was, however, once asserted of this sheep, that it was altogether devoid of wool; and it has been still more lately and strangely maintained, that British sheep, transported to Jamaica, would speedily lose their woolly coat, and become altogether hairy.

THE GRADUAL CHANGE FROM HAIR TO WOOL.

The observation of the occasional admixture of wool and hair, and the experience of the superior utility and value of the wool, would probably induce the early shepherds to take serious note of the circumstances that seemed to influence the proportionate quantity of these substances. It would soon be evident that climate and temperature had much to do with this. The argali has been known in Russia from time immemorial, and regarded by many persons as the origin of the various breeds of domesticated sheep. In summer its coat consists of short hair, sleek, and resembling that of a deer; but in winter it is made up of wool mixed with hair, and concealing at its roots a fine woolly down †.

It is probable, that a change, bearing much resemblance to this, would take place in the primitive flocks, corresponding with the change of seasons. This would naturally suggest the conclusion, that the nature of the coat of the sheep was in some measure dependent on the external temperature; and, that if Providence did not temper the wind to the shorn lamb, it at least suited the defence to the hardship which was to be endured in winter, and the oppressive heat that was to be avoided in summer. Hence probably would follow the experiment, whether, by sheltering from the inclemency of the one season, and the sultriness of the other, a more uniform, and useful, and valuable fleece might not be procured; or, if no direct experiments were instituted, the continual change of pasture which was rendered necessary by the nature of the country and the numerousness of the flocks, and the direction in which the wanderings of the shepherds were performed, from the south to the north until the midst of summer, and from the north to the south until mid-winter, would tend, in some measure, to produce this desired change and improvement in the fleece.

The working of another agent might not escape attention. Both the quantity and the kind of nutriment—the condition in which the sheep are

not a particle of wool. The author was surprised at this, as the argali was described as having a winter coat at least of fine woolly down, and he sent and requested a small portion of the pelt. The hair was long and coarse enough, but at its base was an exceedingly small quantity of crisped wool. There was so little of it that it could scarcely be detected on the pelt, but was clearly seen when a lock of the hair was cut off close to the skin, and held up to the light. This goes far to explain the accounts that have been occasionally given of these perfectly hairy sheep.

* Vol. v. p. 153. † Anderson on Sheep, p. 9.

kept—have, as will be seen in a thousand instances, much influence in determining the character of the fleece, and in this respect among others.

Wherever these hairy sheep are now found, the management of that animal is in a most disgraceful state; and among the cultivated sheep, and those who are the especial subjects of this work—the British sheep—the remains of this ancient hairy covering exist, to any very great extent, among those alone that are comparatively neglected or abandoned. Kemps or hairs have nearly ceased to deteriorate the fleece of the South Downs, and they are little seen in the Leicesters, the Cotswolds, or the Bamptons*; but they are found on the wilds of Dartmoor, and the mountains of Wales, Westmoreland and Scotland, and, from the perfect abandonment of the Shetland sheep, their fine and silky wool is often mixed with long hairs. Where they have been banished from the fleece, they continue to appear upon the faces and legs, particularly in the Wiltshires, and also in the Norfolks, and to a greater or less degree on the belly of several of the breeds of British and foreign sheep. Here they are of no material consequence, for they do not mingle with the prime part of the wool.

These causes, however, would operate only to a limited extent; a more powerful principle would, at a very early period of sheep-husbandry, be called into action—that which enables the agriculturist not only to modify the character of his flock, but to change it altogether—the magician's wand, by means of which he may summon into life whatever form and mould he pleases—the principle of selection—the fact, that "like will produce like." The early shepherd would therefore select for breeding those animals in which the quantity of hair was smaller than usual, and that of wool correspondingly increased—in which the wool not only afforded warmth in winter, but was becoming a permanent covering; and by steady adherence to this, the character of the fleece would be gradually yet essentially changed. There was a selection, from time to time, of those animals to breed from which bore most wool, until ultimately a breed has been obtained, bearing wool only, or nearly so.

THE YOLK.

The filament of the wool has scarcely pushed itself through the pore of the skin, than it has to penetrate through another and singular substance, which, from its adhesiveness and colour, is called the YOLK. It is found in greatest quantity about the breast and shoulders—the very parts that produce the best, and healthiest, and most abundant wool—and in proportion as it extends to any considerable degree over other parts the wool is then improved. It differs in quantity in different breeds: it is very abundant on the Merinos; it is sufficiently plentiful on most of the southern breeds, either to assist in the production of the wool, or to defend the sheep from the inclemency of the weather; but in the northern districts, where the cold is more intense, and the yolk of wool is deficient, a substitute for it is sought by smearing the sheep with a mixture of tar and oil or butter. Where there is a deficiency of yolk, the fibre of the wool is dry, and harsh, and weak, and the whole fleece becomes thin and hairy:

* Where hairs are found in the long-woolled fleece they are generally separated in the process of combing; the remaining wool suffers in some degree from the heat of the comb, or the violence with which it is used, but the noyles (or the portion separated by the comb) are very little injured. Even from the short wool, they are removed by the action of the scribbling machine. It is where the kemps are so intermingled, or so numerous, that they cannot be got rid of, that they are most of all injurious, for by their coarseness and want of elasticity they spoil the cloth before it is dyed; or, if not altogether so, there is great difficulty in dyeing it of a good and permanent colour.

where the natural quantity of it is found, the wool is soft, and oily, and plentiful, and strong. Precisely such, in a less degree, is the effect of the salving in suppling, and strengthening, and increasing the quantity of the wool.

It is not the inspissated perspiration of the animal: it is not composed of matter that has been accidentally picked up and that has lodged in the wool; but it is a peculiar secretion from the glands of the skin, destined to be one of the agents in the nourishment of the wool, and, at the same time, by its adhesiveness, to mat the wool together, and form a secure defence from the wet and the cold*.

The medium quantity of yolk on a Hereford, Shropshire, or Sussex sheep, is about half the fleece; and this is the customary allowance to the wool-buyer, if the fleece has been sold without washing†.

A celebrated French chemist, M. Vauquelin, has made various experiments on the composition of the yolk of wool; the result is as follows:—It is composed, 1st, of a soapy matter with a basis of potash, which formed the greater part of it. 2nd, A small quantity of carbonate of potash. 3rd, A perceptible quantity of acetate of potash. 4th, Lime, whose state of combination he was unacquainted with. 5th, An atom of muriate of potash. 6th, An animal oil, to which he attributed the peculiar odour of the yolk; and, in conclusion, he was of opinion that all these materials were essential to the yolk, and not found in it by accident, for he analysed the yolk in a great number of samples, as well Spanish as French, and found them in all ‡.

The yolk being a true soap, soluble in water, it is easy to account for the comparative ease with which the sheep that have the natural proportion of it are washed in a running stream. There is, however, a small quantity of fatty matter in the fleece, which is not in combination with the alkali, and which, remaining attached to the wool, keeps it a little glutinous notwithstanding the most careful washing §.

* Luccock on Sheep, p. 81. † Agricultural Magazine, March, 1833.

‡ Annal. de Chimie, An. xi. No. 141. See also Philosophical Magazine, vol. xix.

§ An annotator on Vauquelin says, with regard to this, although there is nothing new in the practice to the British wool-seller or buyer, that if, "after this washing in running water, soap, of one-twentieth part of the weight of the wool, is dissolved in a sufficient quantity of warm water, and the wool is often immersed in it and the liquid squeezed out, it will be entirely purified from the small quantity of grease which then adhered to it, and will have a softness and degree of clearness which it could not have had without this operation." Another somewhat singular passage is quoted—the reader must form his own opinion respecting it. "The yolk itself, when a little concentrated, has an efficacious action on the portion of grease which is not in a saponaceous state, for I have found that in putting to the wool only the quantity of water necessary to cover it, it scours better, particularly with a little heat, than when it is washed in running water, but I have also found that when wool has remained too long in its own yolk, it swells, splits, and loses its strength.

"Since the solution of the yolk occasions this swelling and splitting of the wool, is it possible that this accident may happen on the sheep's back, particularly in hot, moist seasons, or when they are shut up in folds in which the litter is not often enough removed? Nor would it be impossible that the acrimony of the yolk may occasion an irritation on their skins, and by that means be the cause of some of the disorders to which this organ is liable in these animals, and which mostly happen in hot and dry weather. Fortunately in these seasons they are from time to time exposed to rains, which wash them and carry off at least a portion of this matter: on this subject I cordially agree with those who think that washing sheep in hot and dry weather would be useful to their health and the quality of their wool."

These are questions which deserve attention; but the evidence, so far as it has been hitherto adduced, goes to this point, that the yolk, and its substitute the common salving, have, in a thousand instances, been manifestly beneficial to the sheep and the wool, and in no case been proved to be injurious, and, in cases like these, more regard is to be had to fact than to the most ingenious and plausible theoretical reasoning.

This subject may be summed up in the comprehensive language of Mr. Luccock. "He," the northern sheep-master, after having applied his salving, "finds this dirty coat as indispensably necessary to the good qualities of the fleece as it is to the health of the animal; without it, the wool becomes hairy, thin, and light; with it, the fleece is full, soft, and rich, possesses a sufficient quantity of healthy yellow yolk, and the qualities and condition of the wool are most wonderfully improved. From these circumstances we conclude that the yolk is not only necessary to the production of a valuable fleece, but is the very pabulum of wool. The manner in which the yolk acts upon the wool is not accurately known. Some have considered it as the superabundance of that substance which forms the filament, and which, by some unknown process, while the pile is growing, is consolidated into a transparent mass; while others conclude, perhaps more reasonably, that it is a peculiar secretion which exudes through the skin, and, by intermingling with the pile, renders it soft, pliable, and healthy, affecting it much in the same way as oil does a thong of leather when kept immersed in it and perfectly saturated. In general this substance has been noticed without any particular reference to the breed of the animal, or the qualities of the fleece which it bears; sometimes as perfectly diregarded as the sand and the hay-seed which are accidentally mingled with the pile. Yet the disposition to produce this valuable animal soap is certainly as important as some other characteristics of the sheep, and ought not to be overlooked when we describe their different varieties or select them for our farms."*

THE DIFFERENCE BETWEEN WOOL AND HAIR.

There is considerable difficulty in describing this. They are essentially the same in chemical composition, and to the unpractised eye they bear much resemblance to each other in appearance. The smallness of the fibre, and its softness and pliability, can scarcely be considered as sufficient distinctive characters; for the hair yielded by some animals is as soft as any silk, while the wool of a few of the favourite breeds of sheep is objected to on account of its harshness. The colour and degree of transparency will not guide the observer; for wool differs in colour on different animals, and different parts of the same animal—at the best it is but a semi-transparent object, and some species of hair are as pervious to light, or as beautifully refract the rays of light, as any wool. The degree also of transparency which wool possesses varies materially with the health and keep of the animal, and numerous other circumstances.

THE PERIODICAL DECIDENCE OF WOOL AND HAIR.

Wool is distinguished from hair by the manner in which it separates from the animal, and is renewed. Most of those animals whose covering is hair, renew their coat at least once in the year: in the horse it is shed twice—in the spring and the autumn. This is evident enough in the colt, and in the farmer's horse, whose coat is often exposed, almost as much as in a state of nature, to the influence and occasional inclemency of the seasons; but when they are domesticated and stabled, the process is far from being regularly conducted; it appears to be in a manner suspended, but it is, in fact, going on all the year round. In the deer it has its regular period; less so in the ox, and least of all in the dog: but in all of them, when the pulpy substance at the root of the hair ceases to be supplied, and, losing its support, the hair is detached and falls off, the different fibres separate, as it were, one

* Luccock on Wool, pp. 82, 84, 85.

by one. The old hair and the new remain together for a season, and no part of the skin is left at any time bare. The period of the reproduction of the hair is very often connected with disease, and almost invariably so with loss of power. The human being, however, is not, like these quadrupeds subject to an annual renewal of the covering of the skin; the hair once produced, continues to grow for many a year, perhaps for life, by prolongation from the root.

There is considerable difficulty respecting this change of external covering in the sheep. It has been commonly believed that there is a periodical moulting, or separation of the old fleece from that which is growing underneath; and there is no doubt, that the greater part or the whole of the fleece of the more neglected breeds begins, about the commencement of summer, to detach itself from the pelt; and much of it would be lost if its separation were not anticipated by the application of the shears. On the other hand, the wool of the lamb that was dropped in the winter or spring shows no disposition to separate, but continues to grow; and the observation of this has introduced a practice, the advantage of which will hereafter be considered, of leaving the hogget wool, for the first sixteen or eighteen months, to acquire additional length of staple. The Merino sheep affords a singular proof how easily the annual change of the fleece—if annual change there is—may be suspended in the domesticated state of that animal. Lord Western has retained the wool of the Merino, without the slightest disposition to separate, during three years. The experiment was also tried at Rambouillet, and the fleece remained on firm and healthy during five years. It had attained its utmost growth at the fourth year, when it was 13 inches long; but it had no disposition to separate from the skin, and probably it would not have fallen off during the life of the sheep*. There were not merely a few cases of this, but the experiment succeeded in every sheep on which it was tried.

How is this to be accounted for? Is it asserted, that the sheep, from exposure to cold in the winter, throws out a diminished and tender fibre, and that, in the spring, the fleece becoming heavy, and getting entangled in the underwood, is easily torn off, the fibres giving way at the tender part or *joint*? This can scarcely be conceded; for whether the winter is mild or severe, the mountain-breeds, and the neglected breeds of sheep (and the short-woolled breeds, more than those who carry long wool, and on whom the fleece would hang heaviest) have, at the latter part of the spring of the year, a decided tendency to cast off their winter clothing. If other wool-bearing animals are examined, there is the same tendency to get rid of that which was given to them for a temporary purpose. The gnoo, the wapiti, the Barbary deer, in our menageries, are striking illustrations of this periodical decidence of the winter coat. The same is familiar to the keeper in every deer-park. The exuviæ—the cast-off covering—consists prin-

* Mr. Luccock very properly remarks that "the decidence of the fleece does not appear to be a characteristic feature of the tribe—an universal law to which all sheep are subject, because some individuals have been observed to retain their coat through two whole years, and a few have carried it even three whole summers. We are not aware that this faculty of retaining the fleece is confined to any particular breed of sheep, nor is it a quality common to every individual. The breeds producing a finer kind of wool often peel and lose a portion of their coat early in the spring, and before the summer had passed would probably part with the whole of it. The pile of the long-wooled sheep seems to be much more firmly attached to the pelt than that of the other breeds, for if the animal is kept in good condition and in good health throughout the whole period when the wool is growing, there is no symptom of a disposition to cast the fleece; while those sheep that have been kept upon commons all the winter, or even in enclosures upon hard fare, will part with it very easily when the food becomes more plentiful, and the condition of the animal is restored to its natural state."—P. 118.

cipally of the woolly portion of the coats, mixed with a variable quantity of hair entangled in it as it had slowly worked its way through the external covering.

This annual separation of a portion of the covering seems to be of almost universal occurrence. It is a consequence of the grand law of nature, that what the comfort and the thriving of the animal requires is, generally speaking, bestowed; but it begins to be removed as soon as it ceases to be needed.

It seems to be almost impossible to account for the universal adoption of the practice of shearing, and everywhere at nearly the same period of the year, except in order to anticipate this periodical separation and loss of the fleece.

The regular peregrinations of the early shepherds from the north to the south, as the summer waned, and from south to north, as the cold became less intense—this approach to equality of temperature all the year round—would, in proportion as the vicissitudes of the seasons were avoided, render an alteration in the fleece less necessary, and the tendency to this periodical decidence less strong. The disposition to part with the wool, which now varies in different breeds, might vary in the sheep of that day; if there were distinctions of breed (and certainly it would vary in different individuals) advantage would soon be taken of that fundamental principle of breeding which had been gradually lessening the quantity of hair and increasing that of wool; and those animals would be selected which not only carried the most wool, but which also evinced the strongest disposition to retain it. Thus, by degrees, a breed would be established, which, if well fed and kept in good condition, and somewhat defended from the inclemency of the winter's cold, would not only retain its wool until it suited the owner's convenience to remove it, but during an indefinite period of time. Still, as takes place in the occasional intermingling of the hair that once formed the outer coat—and the return, even at this distant period, of the primitive colour of the sheep—accident, neglect, cold, starvation, and carelessness as to selection, might, to a greater or less extent, call into action the principle by which the clothing of other wool-bearing animals is governed, and which cultivation and careful selection had suspended in the sheep.

When, before the invention of shearing, the value of the wool had been ascertained, and the occasional falling off of the fleece observed, a singular but inhuman method was resorted to in order to loosen the wool, so that it might be torn from the sheep nearly in one bulk. The poor creatures were confined for three or four days, until they were in a state of the utmost debility, and the fibres of the wool, sharing in the general weakness and derangement, might be without difficulty detached from the skin.

When the fleece of the sheep, either from periodical influence, or some accidental cause, is about to separate from the skin, it does so over the whole or a very considerable part of the body at once; the filaments seem to be simultaneously acted upon by the same power. While the new crop springs up, the old one falls off in large patches, or might be removed altogether: so that no sooner does the fleece cease to be of use to the animal than it is ready to be taken possession of by man, entire or nearly so, in which state alone it can be of any value to him, and converted to valuable purposes. It is true that the interlacing of the fibres of the wool will prevent them from falling so decidedly one by one as in the horse; yet a contemporaneous loosening, over large spaces, can alone account for the manner in which it sometimes appears to come away bodily from so great a part of the animal

THE FORM OF THE FIBRE.

The fibre of the wool, having penetrated the skin and escaped from the yolk, is of a circular form, (varying in diameter in different breeds, and in different parts of the same fleece,) generally larger towards the extremity and also towards the root, and in some instances very considerably so.

The filaments of white wool, when cleaned from grease, are semi-transparent; their surface in some places is beautifully polished, in others curiously encrusted, and they reflect the rays of light in a very pleasing manner. When viewed by the aid of a powerful achromatic microscope, the central part of the fibre has a singularly glittering appearance. Very irregularly-placed minuter filaments are sometimes seen branching from the main trunk like boughs from the principal stem. This exterior polish varies much in different wools, and in wools from the same breed of sheep at different times. When the animal is in good condition and the fleece healthy, the appearance of the fibre is really brilliant; but when the sheep has been half-starved, the wool seems to have sympathized with the state of the constitution, and either a wan, pale light, or sometimes scarcely any, is reflected.

If any great and injudicious alteration has taken place in the management of the sheep during any period of the year, although the fibre may continue to preserve a portion of its brilliancy, a very considerable difference in its appearance will be immediately detected. Some have said (but our microscopical observations on wool will show that to be scarcely possible) that occasionally the change in the structure of the filament is so great that a certain length of hair is interposed between two portions of wool; often, however, close observation will discover a remarkable diminution of the bulk of the fibre, a withered and opaque surface, and a partial loss of the characteristic serrations and cones. These wools are much deteriorated in value; they will give way under the operation of the comb, and will injure or spoil the manufacture in which they are used. A microscope is not always needed in order to discover this change in the wool; but if such an instrument is at hand—and no wool-stapler or wool-grower should be without one—the semi-transparency of the wool, and the opacity of the hair,—and the roundness and fulness of the healthy fibre, and the withered appearance of the joint, or *breach*, as it is called, will form a singular contrast.

As a general rule, the filament is most transparent in the best and most useful wools, whether long or short. It increases with the improvement of the breed, and the fineness and healthiness of the fleece; yet it must be acknowledged that some wools have different degrees of transparency and opacity which do not appear to affect their utility or value. In the Vigonian wools the staple is nearly opaque, but the wool is remarkable for its smooth and silky texture. It is, however, the difference of transparence in the same fleece or in the same filament that is chiefly to be noticed as impairing the value of the wool.

Mr. Luccock speaks of some families of sheep in which the pile is flat and smooth like a small bar of finely-polished steel. A few filaments of wool of this kind the author has observed, but they have seldom been sufficiently numerous to be regarded as constituting the character of the fleece, and in the decided number of cases the appearance has been altogether deceptive. It has arisen from the direction in which the light has fallen on the object; and the lamp being raised, or lowered, or drawn on one side, the seemingly flattened bar assumed its circular but withered form. These sheep had been cruelly neglected, the secretion of the woolly

fibre had never been healthily discharged, and the whole fleece, or a great portion of it, might be said to have assumed a *breachy* character.

THE PROPERTIES OF WOOL.

A consideration of the most important properties of wool, now taken in a very general way, and to be hereafter applied to the different breeds of sheep, cannot be better introduced than in the words of one to whom the agriculturist, whatever department of husbandry may chiefly occupy his attention, is much indebted. He is speaking of the size of the fibre, or the fineness or coarseness of wool. "Fine and coarse," says he, "are but vague and general descriptions of wool; all fine fleeces have some coarse wool, and all coarse fleeces some fine. I shall endeavour, for the information of my readers, to distinguish the various qualities of wool in the order in which they are esteemed and preferred by the manufacturer. First, fineness with close ground, that is, thick-matted ground. Second, pureness. Third, straight-haired when broken by drawing. Fourth, elasticity, rising after compression in the hand. Fifth, staple not too long. Sixth, colour. Seventh, what coarse is in it to be very coarse. Eighth, tenacity. Ninth, not much pitch-mark: but this is no other disadvantage than the loss of weight in scouring.

"The bad or disagreeable properties are—thin, grounded, toppy, curly-haired, and, if in a sorted state, little in it that is very fine; a tender staple, no elasticity, many dead white hairs, very yolky. Those who buy wool for combing and other light goods that do not want milling, wish to find length of staple, fineness of hair, whiteness, tenacity, pureness, elasticity, and not too many pitch-marks*." These supposed good and bad qualities will not be taken in the order here enumerated, for the propriety of some of them may admit of doubt; few, however, will be entirely omitted.

FINENESS.

That property which first attracts attention, and which is of greater importance than any other, is the fineness of the pile—the quantity of fine wool which a fleece yields, and the degree of that fineness. Of the absolute fineness little can be said. It varies to a very considerable degree in different parts of the same fleece, and the diameter of the same fibre is often exceedingly different at the extremity and the centre. The micrometer has sometimes indicated that the diameter of the former is five times as much as that of the latter; and consequently, that a given length of pile taken from the extremity would weigh twenty-five times as much as the same length taken from the centre and cleansed from all yolk and grease †.

That fibre may be considered as coarse whose diameter is more than the five-hundredth part of an inch; in some of the most valuable samples of Saxony wool it has not exceeded the nine-hundredth part of an inch; yet in some animals, but whose wool has not yet been used for manufacturing purposes, it is less than one-twelve-hundredth part of an inch.

The fineness of the wool differs greatly on the different parts of the sheep. That running down the side of the neck and covering the shoulders, the ribs, and the back, is the finest; the next covers the superior part of the legs and the thighs, and extends up to nearly the haunch and the tail; and a still inferior portion runs along the upper part of the neck, the throat, the breast, the belly, and the lower part of the legs. There is considerable variation in this respect in different breeds, and in individuals of the same

* Young's Annals of Agriculture, vol. xviii., p. 329.
† Luccock, p. 178.

breed; and, although a fleece, taken generally, may be said to be adapted to a particular use, yet a portion of it may be employed in the manufacture of a much more valuable article; and at the same time a greater quantity will be thrown aside as not sufficiently fine for the originally intended purpose.

THE WOOLSTAPLER.

This is the business of the woolstapler,—the middleman between the breeder and the manufacturer. He purchases the fleece, and occasionally sells it in the same state, but oftener *assorts* it; dividing it into different parcels, according to their degree of fineness principally, or the possession of some property which fits it for a certain manufacture. The sorter, who ought to have a delicate sense of touch and a quick eye, has several baskets around him, distinguished, at least in his mind's eye, by a certain number according to the fineness of the staple, and into which, with a rapidity that would surprise the inexperienced observer, and with an accuracy that can seldom be disputed, he divides the wool. There are seldom fewer than six divisions, and sometimes more than double that number, according to the quality of the fleece, or the expected demand for wools of a certain kind. The manufacturer, who knows precisely what wool will suit his purpose, and to whom the remainder would be useless, is thus enabled to obtain from the stapler, without trouble or risk, the quantity and the sort that he requires *.

The short wool fleeces are usually distributed into ten parcels. *The picklock*—as its name, the picked locks, would imply—is the very best and choicest wool of the kind, and many fleeces of inferior wool are sometimes assorted before any great quantity is thrown into this basket. *The prime*, an excellent wool, and but in a slight degree inferior to the first. The two next divisions, *the choice* and *the super*, are good wools, but the fineness or the trueness of the staple gradually decreasing. The greater part of a good *Down* fleece would, on assortment, be chiefly thrown into one or the other of these compartments, but some proportion even of the best would find its way into the baskets yet to be mentioned. *The head*, this title either indicates the part of the sheep whence the wool is usually procured, or that it is at the head of the inferior sorts. The sixth division is—*the downrights*, an honest, sound wool; but that is all that can be said about it. Next comes *the seconds*—the best of the wool from the throat or breast. The eighth is—*the abb*, a disputed and unintelligible term, meaning a still inferior wool. *The livery*—principally the skirtings and edgings, and *the short coarse* or *breech wool*, that which comes from the breech of the animal.

THE INFLUENCE OF TEMPERATURE.

Various causes affect the fineness of the pile; and temperature, if not the most powerful of them, deserves more attention than has been paid to it. It has already been observed, and it is a matter of common remark, that the extremities of the wool, and, frequently, those portions which are near to the root, are larger than the intermediate parts. The extremity of the fibre has generally the greatest bulk of all. It is the product of summer,

* —— Nimbly, with habitual speed,
They sever lock from lock, and long and short,
And soft, and rigid, pile in several heaps.
This the dark hatter asks; another shines
Tempting the clothier; that the hosier seeks;
The long bright lock is apt for airy stuffs.

DYER's *Fleece*, b. ii.

soon after the shearing time; when the secretion of the matter of wool is increased, and when the pores of the skin are relaxed and open, and permit a larger fibre to protrude. The portion near the root is the growth of the spring, when the weather is getting warm; and the intermediate part is the offspring of winter, when, under the influence of the cold, the pores of the skin contract, and permit only a finer hair to escape; while, probably, some of the cutaneous glands concerned in the growth of the fibre cease to act*.

If, however, the animal is well fed, the diminution of the bulk of the fibre will not be followed by weakness or decay, but in proportion as the pile becomes fine, the value of the fleece will be increased; but if cold and starvation should go hand in hand, the woolly fibre will not only diminish in bulk, but in health and strength and worth.

The variations in the diameter of the wool in different parts of the fibre will also curiously correspond with the degree of heat at the time the respective portions were produced. The fibre of the wool, and the record of the meteorologist will singularly agree, if the variations in temperature are sufficiently distant from each other for any appreciable part of the fibre to grow †.

* The wool of the lamb—whether shorn in the first summer, or remaining until the second under the denomination of hogget wool—is an exception to this: the extremity of the fibre is *pointed*. It is easy to suppose that this would be the natural form of the fibre when it first pierces the summit of the bulb; but at a very short distance from the extremity it begins to obey the same law which governs the other wool, and varies in diameter, according to the temperature of the season.

Some of the French philosophers account for the pointed extremity of the wool in the lamb, and its increase of bulk in older sheep in a very curious way. "The fibre of wool continues to derive nourishment from the fluid contained in the bulb whence it sprang; some part of this fluid it assimilates for its own growth, and the superabundant part it excretes or throws off. In the first wool of the lamb, the extremity of which has not been cut, this excretion can only take place by means of the pores in the tissue of the hair; but when, in the shearing, the canal of the tube is opened, an easier and more abundant secretion will be established, and the fluid will take the habit of flowing towards the newly-effected aperture. It may also be added, that the porous tissue of the wool possessing the property of absorption, that function will be exerted more efficaciously towards the exterior extremity of the fibre, which lies on the surface of the fleece, than on the part near the root which is closely covered, and thus the fibre increases in bulk towards its exterior extremity."—*Nouveau Traité sur la Laine par* Le Vicomte Perrault de Jotemps *et* MM. Fabry (fils) *et* F. Girod de L'Ain.

† Dr. Anderson was the first who noticed this self-registering animal thermometer, and his account of it ought to be recorded. "This phenomenon appeared to tally so exactly with the idea I had preconceived, as to make me afraid lest I might become the dupe of my own prejudices, which might make me imagine that I actually perceived things that only existed in my own imagination.

"To satisfy myself, however, experimentally, as to the difference in these respects between the wool of this and the former year (1773 and 1774-5), I was at pains to procure some wool of the last year's growth.

"1. The difference between the point and the root of the filament of wool of crop 1773-4 was much greater than between the two ends of the filament that grew in the year 1774-5; and

"2. The difference between the root end and the smaller part of the filament was much greater in the wool or crop 1774-5 than in that of the former season. This was perceived and acknowledged by others besides myself, as before, to prevent my being deceived.

"These phenomena were the natural consequences of the two different seasons in which the separate filaments were produced; for the summer of 1773 was very warm and comfortable, and the winter of the same year uncommonly mild; the spring of the year 1774 having been the coldest and most uncomfortable that was almost ever known.

"Hence the points of the wool were coarse and the roots fine to as great a degree as may ever be expected to happen in this climate; and as there was little variation between the temperature of the winter 1773-4, and the spring 1774, there was likewise little variation between the roots and the finest parts of the filament.

"But

It will follow from this, that the natural tendency to produce wool of a certain fibre being the same, sheep in a hot climate will yield a comparatively coarse wool, and those in a cold climate will carry a finer, but at the same time a closer and a warmer fleece. In proportion to the coarseness of the fleece will generally be its openness, and its inability to resist either cold or wet; while the coat of softer, smaller, more pliable wool will admit of no interstices between its fibres, and will bid defiance to frost and storms.

The natural instinct of the sheep would seem to teach the wool-grower the advantage of attending to the influence of temperature on him. He is evidently impatient of heat. In the open districts and where no shelter is near, he climbs to the highest parts of his walk, that if the rays of the sun must still fall on him he may nevertheless be cooled by the breeze; but if shelter is near, of whatever kind, every shaded spot is crowded with sheep.

Lord Somerville says, "The wool of our Merino sheep after shear-time is hard and coarse to such a degree as to render it almost impossible to suppose that the same animal could bear wool so opposite in quality, compared to that which had been clipped from it in the course of the same season. As the cold weather advances, the fleeces recover their soft quality*." Enough will be said in the course of the work respecting the duty and the propriety of giving these useful animals, when placed in exposed situations, some shelter from the driving storms of winter; and the alteration in the fibre of the wool shows that it would also be advisable to provide the flock with a shade and defence against the fervid rays of a meridian sun in the summer-months.

A writer of high authority thus expresses himself: "Sheep carried from a cold to a warmer climate soon undergo a remarkable change in the appearance of their fleece. From being very fine and thick, it becomes thin and coarse; until at length it degenerates into hair. Even if this change should not take place to its full extent in the individual, it will infallibly do so in the course of one or two generations. The sheep that we see covered with hair are not therefore in reality a different species from those that are woolly, nor is wool in its nature specifically different from hair—it is only a softer and finer kind of hair. The effect of heat is nearly the same on the hairs of other animals. The same species that in Russia, Siberia, and North America, produce the most beautiful and valuable furs, have nothing in the warmer climates, but a coarse and thin covering of hair†."

It will be evident from what has been already said of the gradual change from hair to wool, that this account must be received with very great limitation. Temperature and pasture have influence on the fineness of the fibre, and one which the farmer should never disregard; but he may, in a great measure, counteract this influence by careful management, and selection in breeding. The original tendency to the production of a fleece of mixed materials existing, and the longer coarse hair covering and defending the shorter and softer wool, nature may be gradually adapting the animal to his new locality; the hair may increase and the wool may diminish, if man is idle all the while; but a little attention to breeding and management will limit the extent of the evil, or prevent it altogether. A better

"But as the heat of the spring 1775 was greater than we almost ever experienced, the roots of the wool of that year's growth were uncommonly coarse, so as to differ much more than usually happens from the small parts of the filament produced in winter, which was probably the cause of my remarking it so readily that year although it had escaped me before."—Anderson on Wool, p. 124-127.

* See his note on the effect of temperature. Bakewell, p. 26. Ibid. p. 154.

† Account of Pegu, by Mr. Hunter. 1785.

illustration of this cannot be found, than in the fact that the Merino has been transplanted to every latitude on the temperate zone and to some beyond it—to Sweden in the north, and Australia in the south, and has retained its tendency to produce wool exclusively, and wool of nearly equal fineness and value.

Mr. Luccock's summary of the effect of temperature on wool is so much to the purpose in the present state of knowledge, or rather comparative ignorance, of this subject, that it is quoted here. "If the manner in which wool is produced were more accurately noticed—if the effects of changing seasons were more diligently noted—if care were taken to preserve the fleeces which an individual had afforded in different situations and under varied treatment, so that they might be compared with each other—and if the staple were either measured or marked at regular intervals of time, we should ascertain a number of facts respecting the production of wool, which we are at present ignorant of; and perhaps might be able to procure it in a much more perfect state. Until our knowledge becomes more perfect, we must consider the influence of temperature as reduced to one point, which requires only that the shepherd do not unnecessarily expose his flocks to the extremes of heat or of cold, nor to any capricious changes." This last sentence cannot be fully assented to, but the former remarks are invaluable.

PASTURE.

Pasture has a far greater influence on the fineness of the fleece. The staple of the wool, like every other part of the sheep, must increase in length or in bulk when the animal has a superabundance of nutriment; and, on the other hand, the secretion which forms the wool must decrease like every other, when sufficient nourishment is not afforded.

When little cold has been experienced in the winter, and vegetation has been scarcely checked, the sheep yields an abundant crop of wool, but the fleece is perceptibly coarser as well as heavier. When the frost has been severe and the ground long covered with snow—if the flock has been fairly supplied with nutriment, although the fleece may have lost a little in weight, it will have acquired a superior degree of fineness, and a proportional increase of value. Should, however, the sheep have been neglected and starved during this prolongation of cold weather, the fleece as well as the carcase is thinner, and although it may have preserved its smallness of filament, it has lost in weight, and strength, and usefulness. These are self-evident facts, and need not to be enforced by any laboured argument; and therefore it is that since the sheep-breeder, living in a populous country, has begun, and judiciously so, to look more to the profit to be derived from the carcase—since the system of artificial feeding has been brought to so great perfection—and a larger and better animal has been earlier sent to market, and a far greater number of sheep can now be fed and perfected on the same number of acres, the wool also has been somewhat altered in character—it has grown in length, and it has increased in bulk of fibre. *It has not deteriorated, but it has changed.* If no longer fit for the purposes to which it was once devoted, it has become suited to others. If it no longer brings the extravagant price it once did, it meets with a readier sale. The increase of the number of fleeces, and the increase of weight in each fleece, go far to compensate for the diminution of price, while the improvement of the carcase more than supplies the deficiency, if in truth there were any: so that, considering the badness of the times, and the state of agriculture generally, the sheep is comparatively more valuable to the breeder than he was

before. This will be touched on at greater length when the various breeds of British sheep pass in review, and their present state and produce is compared with what they were half a century ago.

Wool is now the subject of consideration, and there can be no doubt that in Great Britain it has materially changed its character since the introduction of artificial food, and the adoption of the forcing system. Mr. Nottage states, of the Western Down sheep, that he used to get one-eighth part of the finest English wool from each fleece; but that now the quantity is so small that he does not throw it out: he does not set a basket for it at all. Mr. Sutcliffe says, that "Thirty years ago there was, in some South Down flocks, nearly as good wool grown, as the fine German that now comes into our country." Mr. Varley adds, that "he used to throw his wool extremely high to the sort—very good to the sort—but he found that the qualities generally were getting so low, that if he continued that sort of practice, he should have been looking into two of his best bins without finding a bit of wool in them." Mr. Fison states of the Norfolks, that "in 1780, 420lbs. of clothing wool grown in Norfolk would produce 200lbs. prime—in 1828, it would produce only 14lbs*."

These are convincing proofs of the effect on the fleece of high keep, and the breeding for larger sheep.

In the early establishment of the improved Leicesters, it was an accusation, which their most zealous supporters did not attempt to deny, that the wool was sacrificed to the carcase; nay, the very founder of that breed of sheep stated to his namesake of Wakefield that "he had no doubt that fine wools might be grown on rich pasture lands by overstocking them, and preventing sheep from obtaining more nourishment than they had been accustomed to†."

Dr. Parry, whose observations on sheep-husbandry always deserve attention, and whose opinions, except when he was deluded by his fondness for the Merinos, are very correct, says that sheep-breeders "had observed a sort of gross connexion between the food and the quality of the fleece. On the one hand, the staple of a sheep that was starved was weak, and the wool dry and unprofitable in the manufacture. On the other hand, the wool of sheep on deep inclosed pasture, or on artificial food, was found to be coarser and more intractable than that from the downs. On these two simple facts they thought themselves qualified to reason, and, as is unavoidable from insufficient premises, they reasoned falsely. They concluded that the fine herbage of the downs necessarily produced fine wool; and that none but coarse wool could spring from gross luxuriant food. Neither of these conclusions is precisely true. The fineness of a sheep's fleece of a given breed is, within certain limits, inversely as its fatness, and perhaps also (although I am not certain of this point) as the quickness with which it grows fat. A sheep which is fat has usually comparatively coarse wool, and one which is lean, either from want of food or disease, has the finest wool; and the very same sheep may at different times, according to these circumstances, have fleeces of all the intermediate qualities from extreme fineness to comparative coarseness‡."

All this is very true and very important; except that opinion, of the truth of which Dr. Parry confesses that he is not certain, "that coarseness

* Examinations before the House of Lords in 1828. † Bakewell on Sheep, p. 84.

‡ Columella, whose sheep were cultivated principally for their fleece, mentions the hungry lands about Parma and Modena, as feeding the most valuable sheep; and Virgil was perfectly aware of the influence of luxuriant pasture in giving coarseness to the fleece when he warns against the "*pabula læta*,"—

Nor in too rank a pasture let them live.

of wool and disposition to grow fat are connected. The experience of the British sheep-master would prove that the finest woolled sheep will maintain themselves in tolerable condition where coarser ones will starve; and that when both are placed in a situation to exhibit their tendency to fatten quickly, and to a great extent, the fine woolled sheep will beat his rival out of the field.

"There used to be great controversy with regard to the influence of particular kinds of food on the wool. There are no decisive proofs as to this. Between diversities of food wholesome and nutritious, there will be little to choose; or rather experience will prove that an occasional change of food is not only grateful but advantageous to the sheep*."

TRUENESS.

Connected with fineness is trueness of staple—as equal a growth as possible over the animal—a freedom from the shaggy portions, here and there, which are occasionally observed on poor and neglected sheep. These portions are always coarse and comparatively worthless, and they indicate an irregular and unhealthy action of the secretion of wool, and which will probably weaken or render the fibre diseased in other parts.

Comprised in trueness of fibre is another circumstance that has been already alluded to—a freedom from coarse hairs which project above the general level of the wool in various parts, or, if they are not externally seen, mingle with the wool and debase its character.

In the same term, and most important of all, is a freedom from those irregularities in the bulk of the fibres of the wool, which render it difficult at times to give it a definite name and character, and which must materially interfere with its usefulness; and also those *breaches* in the wool so singular in their appearance, which have been already described, and the distance of which from the extremity or the root will enable the observer, as has been already stated, to calculate the time when the imperfection occurred, and which may generally be traced to cold or starvation, or to some malady of the skin itself†."

SOUNDNESS.

Soundness is intimately connected with "trueness;" it means strength of the fibre generally, and also a freedom from those breaches or withered portions to which allusion has been made. The unassisted eye, or at least the eye of the wool-stapler or sorter, will readily detect the breaches; but the hair generally may not possess a degree of strength proportionate to its bulk. This is ascertained by drawing a few hairs out of the staple, and grasping each of them singly by both ends, and pulling them until they break.

Soundness is a very important property in wool, and was absolutely indispensable in long wool when that alone was subjected to the operation of the comb. If it broke in pieces in the act of combing, the shreds (termed

* Bath Society Papers, vol. xi. p 211.

† ——— It oft deceives the artist's care,
Breaking unuseful in the steely comb:
For this long spongy wool no more increase
Receives, while winter petrifies the fields.
The growth of autumn stops; and what though spring
Succeeds with rosy finger and spins on
The texture; yet in vain she strives to link
The silver twine to that of autumn's hand.
Be then the swain advised to shield his flocks
From winter's deadening frosts and whelming snows.
DYER'S *Fleece*, b. ii.

noils) were useless in the worsted manufactory, and, indeed, were regarded as little better than refuse: when it is recollected that the clothing-wools are not required to possess so great a degree of strength as the old combing ones, but, on the contrary, would be less useful if they had this strength; and that now, many short wools being made to undergo the process of combing,—the sound portion of one part of the staple may be mixed with the tenderer fibre from another part or another fleece, and, possibly, even a denser pile may be raised on the surface of the cloth. There is, however, a limit to the tenderness of that clothing-wool, which may pass muster with the manufacturer. Not only the pile may be properly broken under the operation of the card, but it may become so comminuted that it will either be driven away, dissipated by the action of the cylinders, or it may afterwards break, and the fabric of the cloth be destroyed under the beating of the fulling-mill.

The wool of sickly or murrain sheep is generally not only finer than in a healthy sheep of the same breed, but it possesses this tender quality, not to be detected by the eye, nor even by the microscope; unless that it may be suspected by a slighter degree of polish, and not having so full and round an appearance.

Age has often much effect in deteriorating the fleece. The yolk lessens in quantity after the sheep, and especially the ewe, is six years old; and, to the decrease of the yolk, there soon follows a hard, inelastic, unyielding character of the wool, that renders it useless for several purposes for which the younger, and especially the wether-wool, is sought. Mr. Luccock applies a very singular, but appropriate word, to this old ewe-wool—"it dies in the bowl*"—it sinks in the water in which it is washed—and acquires there a shrivelled and dead-like appearance. It is difficult to spin, and it materially injures the manufacture in which it is employed.

The wool often becomes considerably injured by felting while it is on the sheep's back. This is principally seen in the heavy breeds, especially those that are neglected and half-starved. It generally begins in the winter season, when the coat has been completely saturated with wet; and it increases until shearing time, unless the cot separates from the wool beneath and drops off. The *cotting* of wool is only an injurious extension of the process of felting—the wool forms into a hard thick knot that can scarcely ever be unravelled.

Some breeds are more subject than others to this defect: the Morfe sheep and the Cheviots have been especially accused of possessing this harling property in the wool. It occurs before the wool has begun to separate from the skin; but then by its weight, and the manner in which it acts on the portion below, the wool begins to be gradually detached from the back and connected only by a few scattered hairs, while a new crop grows underneath.

Collections of a similar kind are frequently seen under the ears of long and fine-haired spaniels.

Mr. Parkinson speaks of two diseases, or rather defects of wool †. The first he calls a *feathery* wool, set very thinly upon the pelt, and falling very closely together. "When shorn it laps up in very small bundles, and weighs heavy, according to its substance, but the whole fleeces are of light weight; it also is weak and curled, and breaks much in combing." This, with his wonted prejudice against the improved Leicesters, he affirms to be the usual character of their wool.

The other defect he calls *watery* wool,—"it is so full of grease that it looks damp; and a stranger to this kind of wool would be assured that it

* Luccock, p. 134. † Parkinson on Live Stock, vol. i. p. 261.

had been wetted, and the proper smell of the wool will alone undeceive him." This wool, according to him, is frequently seen on the coarse Lincolns. He says that this *watery* wool is a very bad sort, and on poor sheep is frequently cotted, and at all times is of an objectionable quality for the manufacturer.

Wool is generally injured by keeping. It will probably increase a little in weight for a few months, especially if kept in a damp place; but after that it will somewhat rapidly become lighter, until a very considerable loss will often be sustained. This, however, is not the worst of the case; for, except very great care is taken, the moth will get into the bundles and injure and destroy the staple; and that which remains untouched by them will become considerably harsher and less pliable. If to this the loss of the interest of money is added, it will be seen that he seldom acts wisely who long hoards his wool, when he can obtain what approaches to a fair remunerating price for it.

SOFTNESS.

If the pile is sound, there are few qualities in wool of so much consequence as softness. Fashion has done much in effecting this. Since the importation of the soft wools of Spain and Saxony, even the farmer himself will no longer wear the good, but somewhat harsh clothing with which he used to be content. He does not examine, and the manufacturer is not anxious to exhibit, the fineness or the trueness of the threads of the cloth; but his judgment is guided by the softness, and at the same time the substance of the material, and he is perfectly right: for no clothing is so comfortable or so durable as that which the increased pliability and softness of the woolly fibre, and the application of the fulling-machine, and the improvement of machinery generally, have produced.

The old manufacture of cloth could not be carried on to any degree of perfection, except the material on which the workman operated was soft and pliable. A stubborn and a brittle substance would perish under the manipulations to which it was necessarily subjected; or, after the exertion of his greatest skill, the fabric would do the workman little credit: for the thread would not be firm, nor would the surface of the cloth be pleasing to the feeling. It is now admitted that the pile can scarcely be too soft and silky, if the strength is not impaired *; and it has been affirmed, that two packs of sorted wool being taken, possessing the same degree of fineness, but the one having the soft quality in an eminent degree, and the other being harsh, the cloth prepared from the first, at the same expense, will be worth more to the manufacturer than the other by full 25 per cent.

The cause of this softness of pile, or the means by which it may be induced or increased, are not yet sufficiently known. It may hereafter appear that the mechanical structure of the wool,—those irregularities of surface,—those joints possibly—of which we shall presently catch a glimpse—have much to do with it; and their number, or their action, although depending mostly on the breed, may yet be influenced by circum-

* The opinion that softness was essential to the woolly fibre is of no recent date. Varro speaks of the wool,—"Quæ multa sit et mollis, villis altis, et densis toto corpore," —wool, great in quality, and soft, long in the fibre, and equally diffused over the whole of the body. It must not, however, be hastily concluded that they were long-woolled sheep that were then mostly prized; but that comparative length, as well as softness of fibre, were essential qualities.

Palladius, another valuable writer on ancient husbandry, recommends the sheep,—"Vasti corporis, et prolixi velleris, ac mollissimi,"—of large size, with long wool, and that of the softest character.

stances over which the sheep-master has considerable control. There can be no doubt that this quality is mainly dependent on the fineness of the fibre. A thread must be more flexible than a cord. It is also evidently connected with the breed: there are some sheep to whose fleece no degree of neglect can communicate a decidedly harsh character, while the wool of others has many valuable properties, but there is a stubbornness about it which the sheep-farmer has tried in vain to eradicate.

Softness of the pile is evidently connected with the presence and quantity of yolk. There is no doubt that this substance is designed, not only to nourish the hair, but to give it richness and pliability. In what way is the growth of the yolk to be promoted? By paying more attention than our agriculturists are accustomed to give to the quantity and the quality of this substance possessed by the animals which they select for the purpose of breeding. The quantity and the quality of the yolk, on which many farmers now scarcely bestow a thought, and the nature of which they neither understand nor care about, will, at some future time, be regarded as the very essential and cardinal points of the sheep.

Bad management, neglect, exposure, starvation, impair the pliability of the woolly fibre, but chiefly so because they arrest the secretion of the yolk, or change its properties. It is because the salving of the sheep either increases the production of the yolk, where it was comparatively deficient, or acts as a substitute for it, and that of no mean power, that the northern breeders so universally have recourse to it. Mr. Bakewell's testimony deserves recording here. "I was led to the application of it," says he, "by observing the well-known effect produced on human hair when daily washed with soap and water, and comparing it with the same hair less frequently washed, and sometimes rubbed with an ointment; by the former practice it became hard and bristly, by the latter it was rendered soft and pliable. A little time after, an intelligent clothier in my neighbourhood who kept a small flock of fine-woolled sheep, informed me he had adopted the practice of rubbing the sheep with a mixture of butter and tar. He could speak decidedly to the improvement the wool had received by it, having superintended the whole process of the manufacture. The cloth produced was superior to what ungreased wool could have made, if equally fine; it was remarkably soft to the touch, and had what he called 'a good bottom, a good top, and a good hand and feel'—*i. e.*, the appearance of the threads was nearly lost in a firm even texture, covered with a soft full pile." Mr. Bakewell, adds, "a further investigation has given me the most ample and satisfactory proofs, that by the application of a well-chosen unguent, wool may be defended from the action of the soil and elements, and improved more than can be effected by any other means, except an entire change of breed." These are strong assertions, but no less strong than true, with regard to those breeds, and situations where salving is indicated.

On the effect of *clothing*, the evidence is strangely contradictory: this, however, is not the place to enter fully into the consideration of it. There can be no doubt that it is indispensable with regard to the choice specimens of the New Leicester breeding rams. On account of their fatness it is often necessary to shear them early in the season; and, in order that the supposed beauty of their form may be more perfectly displayed, it is usual to shear them exceeding closely; there would, consequently, be danger of catarrh, or many sad chest affections, if they were at once exposed to the frequently piercing cold of a spring night. This artificial covering is, however, in the majority of cases, left off as soon as the wool is a little grown. The expense of clothing, supposing, which is doubtful, that its

influence on the fineness and softness of the wool were established, would be an insuperable objection to its general use*.

There is no doubt that soil has much influence in producing harshness of the pile. A chalky soil notoriously deteriorates the softness of the wool on the sheep that graze there. Minute particles of the chalk being necessarily brought into contact with the fleece, and mixing with it, have a corrosive effect on the fibre, and harden it and render it less pliable. Many well-known facts render this highly probable. The business of the fellmonger furnishes a striking elucidation of this: his first proceeding is to separate the wool from the pelt; and in order to effect this he exposes it to the action of lime-water, and in a very short space of time the hair is shrivelled, killed, and easily scraped away.

In the living animal a process of the same kind may be more gradually going forward, aided also by another, little suspected, yet highly injurious. The particles of chalk come in contact with the yolk—there is a chemical affinity between the alkali and the oily matter of the yolk—they immediately unite, and a true soap is formed. The first storm washes away a portion of it, and the wool, deprived of its natural pabulum and unguent, loses some of its vital properties, and its pliability among the rest. The slight degree of harshness which has been supposed to belong to the South Down wools may be accounted for in this way.

Mr. Bakewell, to whose work, full of useful information, the author is proud to acknowledge himself frequently and deeply indebted, gives an illustration of this which will put an end to all doubt that could possibly remain about it. In the northern parts of Derbyshire the mineral strata are so abruptly broken, that two adjoining farms, separated by a small brook, would not unfrequently be found, the one on limestone, and the other on a siliceous grit or sandstone. The difference of the wool on those two farms, and from the same breed of sheep, and particularly with regard to its harshness or softness, is so distinctly marked, and was, even twenty years since, so well known, that the farmer would demand and obtain 1*s.* or 1*s.* 6*d.* per tod more for his wool when grown upon the latter soil.

ELASTICITY.

There are two antagonist principles continually at work in every part of the frame of every animal; and it is on the delicate adjustment and balance

* The reader is presented with a strange and almost ludicrous contrariety of opinion on this point, expressed in different volumes of the same work, now out of date, but valuable in its time.

"The other experiment, that of clothing sheep, was tried on a small scale by Mr. Brodie at Upper Keith, near Edinburgh. The improvement in regard to the quality of the wool was very great, and fully justifies the accounts handed down to us by ancient writers respecting the advantages of that practice. It is believed that clothing the long-woolled sheep, and clipping them thrice a year, is the greatest improvement practicable with regard to that breed. It converts combing into clothing wool, and while it increases the quantity and improves the quality of the fleece, it is of essential service to the carcass. Common unbleached or green linen done over with Lord Dundonald's tar, by which the bad effects of wet, more prejudicial to the sheep than cold, are prevented, is the best covering. The expense is trifling, not exceeding 7*d.* each, and the covering will probably last, with common attention, two or three years."—Young's Annals of Agriculture, vol. xv. p. 436.

Now 'audi alteram partem:' "Clothing the sheep must, I imagine, be prejudicial both to the sheep and the wool. Without sun, air, or dews, the wool would not grow to more than two-thirds of its usual length, if so much, and the hair would be weak and rotten, and not possess sufficient strength to undergo the different operations of carding, skinning, &c. As to the sheep itself, it is more than probable that its constitution would be much weakened by having the external air kept from its body, and that the flesh would acquire a rancid, unpleasant flavour; as we find that a small degree of heat before a sheep is shorn has a surprising effect on the taste of the flesh, and that it does not acquire its usual flavour in less than three weeks or a month after the fleece is taken off."—Young's Annals of Agriculture, vol. xli. p. 515.

of power between them, that all healthy and useful action depends—the disposition to give way, or to submit to some alteration of form when pressed upon, and an energy, by means of which the original form is resumed, as soon as the external force is removed. It has been observed that a fibre of wool closely examined presents a succession of minute spiral curves. It may be extended between the fingers, but, as soon as one end is free, the hair resumes the corkscrew-form which it had before. Until some of its properties are impaired by art, it will pertinaciously resume its curved appearance whenever it has liberty so to do. It is the union of its pliability with this principle of elasticity—the facility of extension and the tendency to take on again its crumpled form, and each of them modified by various circumstances, that constitutes the usefulness, and, consequently, the value of wool.

The play of these powers is differently adjusted in different wools. In the finer sorts, and that were destined to form the thinner and more delicate fabrics, the balance between the yielding and elastic power is curiously and beautifully adjusted: hence, the softness and the fineness of the thread, and of the cloth—the facility with which it is shorn—the ease with which it yields to pressure, and yet the tendency to assume its natural form, and to cover the surface of the cloth with a dense nap, or innumerable minute curves. It is true that many of these are formed, or their formation is aided, by art—the scissors may cut away superfluous spirals—the heated plate may repress more of them; but to this modification of the principle of elasticity, this mysterious disposition to return to or resume the natural curve, the beauty and the value of the modern cloth is principally owing.

In coarser kinds of goods the elasticity of the fibre is more required, and it seems to have its full play. Without it, how would the manufacturer obtain the long and luxuriant nap with which the blanket is covered, or which are found on the thicker coatings that are made to brave the inclemency of the weather? If the natural direction and curve of the wool is changed, and kept so for a considerable time, the fibre seems to adopt the figure which is forced upon it, and the principle of elasticity is called into exercise to maintain the artificial curve. This is particularly the case if heat has been applied to produce the new direction in the hair. In this way the fanciful naps in various cloths are raised, some of which will maintain the form that has been forced upon them with all the pertinacity with which the fibres previously returned to their native drooping ringlet-like construction. The principle of elasticity is one of very great moment: there are many pleasing illustrations of its singular and beautiful modification, but there is much obscurity connected with its manner of acting, and it has not received the attention which it merits.

COLOUR.

This is of minor, and yet of no trifling importance. The alteration of the colour was the first recorded improvement of the sheep—and its purity—its perfect whiteness—should never be lost sight of by the sheep-master of the present day. Very commendable attention has been paid to this. The South Down sheep has driven from his fleece the grey hue which his face and legs continue to wear; the Norfolk no longer retains on his back the negro-stain which he carries on his front; and although the colour of these breeds cannot quite compete with the pure white of some of the long-woolled sheep, there is little now to complain of so far as every useful purpose is concerned. It must, however, be confessed that the breeder is not, in every respect, so careful as he ought to be.

To a certain extent the fleece is frequently stained with the colour of the soil on which the animal grows. In some parts of Gloucestershire the wool acquires an orange colour; in Hertfordshire and Warwickshire it is of a brownish red, and in the fens of Lincoln and Cambridge it has a dark blue tint *.

The particles of the soil mixing with the fleece gradually stain it of their own colour. In some cases the acquired dingy or other hue may be removed by careful scouring; but this entails additional trouble and expense: in other instances the tint is permanent. It does not seriously interfere with the process of dyeing, except in a few cases of rare occurrence; but the wool is injured for other purposes where whiteness is required.

In some districts, and particularly in the west of England, the farmer needlessly uses a considerable quantity of ochre or ruddle, either in the composition of his salving mixture, or to gratify a foolish fancy. In either case he applies that which cannot produce any good effect, and which occasionally leaves a tint on the wool that the most careful scouring will not efface. The tar gives consistence to the oil or butter, and although it is often with considerable difficulty washed away, yet while it remains on the fleece it gives a permanency to the smearing process; not one plea, however, can be offered in favour of the ruddle.

The yolk sometimes leaves a permanent stain on the fleece. It rarely does so when this secretion has been plentiful and healthy: the stain is usually left when the yolk has been deficient in quantity, or altered in quality, or when the weather has been sultry, and too long time has been suffered to elapse between the washing and the shearing.

FELTING.

It has been stated, when describing the patriarchal sheep, that although the clothing of the primitive family consisted of the skins of animals, and probably of the sheep, no very lengthened period would elapse before the circumstance of the felting or the matting of the wool on the back of the sheep would attract attention. When these matted portions were separated from the fleece, experiment—rude enough perhaps, or accident—would discover that these matted portions or others that were not previously harled, might, by moisture and pressure, or beating, be worked into a soft and pliable substance of almost any size or form, and from which a covering far more comfortable than any skin might be contrived. This has been the progress of improvement in dress, and in the manufacture of wool in every country, and almost every age. The wandering shepherds, who at the present day traverse regions similar to those in which the Patriarchs sojourned, thus manufacture the carpets that defend them from the cold and dampness of the ground. The Tartars spread two or three layers of wool moistened, and tread it under foot for a few hours, and form their carpets without the aid of the loom or the modern invention of cylinders †. "This latent property of felting," says Mr. Luccock, "seems to have been first excited by the pressure obtained by the weight of the human body. The cloth in its rough state being placed beneath the feet of the workmen, they continued to trample upon it until sufficiently thickened; hence, the person engaged in this employment was called a walker or welter of cloth, and the machine afterwards introduced to answer the same purpose was denominated a walking-mill ‡."

* Bakewell on Sheep, p. 31. † Ibid., p. 16.
‡ Luccock on Wool, p. 165, quoting from Mrs. Guthrie's Tour through the Taurida.

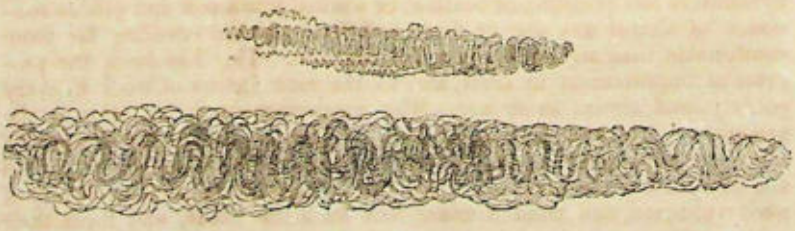
The first improvement consisted in substituting a sitting posture for an erect one, thus enabling the work-people to perform their task more rapidly and with greater ease. Mr. Pennant gives the following account of this as he saw it performed in the Isle of Skye: "On my return I am entertained with a rehearsal, I may call it, of the luagh or walking of cloth. Twelve or fourteen women, divided into two equal numbers, sit down on each side of a long board, ribbed lengthwise, placing the cloth upon it. First they begin to work it backwards and forwards with their hands, singing at the same time: when they have tired their hands every female uses her feet for the same purpose, (still sitting,) and six or seven pair of naked feet are in the most violent agitation, working one against the other. As by this time they grow very earnest in their labours, the fury of their song rises; at length it arrives at such a pitch, that without breach of charity you would suppose a troop of female demoniacs to have assembled*."

The practice of making cloth by the felting process was not soon superseded by the invention of weaving, even among the most polished people. Pliny thus speaks of its continuance in his time: "Moreover, wool of itself driven into a felt without spinning or weaving, serveth to make garments with; and if vinegar be used in the working of it, such felts are of good proof to bear off the edge and point of the sword; yea, and more than that, they will check the course of fire †."

The felting property of wool may be defined to be a tendency in the fibres to entangle themselves together, and to form a mass more or less difficult to unravel. The consideration of the causes of the felting of wool will lead to the explanation of other differences, and those the most important and characteristic, in the structure of that material.

THE SPIRALLY-CURLING FORM OF WOOL.

The most evident distinguishing quality between hair and wool is the comparative straightness of the former, and the crisped or spirally-curling form which the latter assumes. If a little lock of wool is held up to the light, every fibre of it is twisted into numerous minute corkscrew-like ringlets. This is seen especially in the fleece of the short-woolled sheep; but, although less striking, it is obvious even in wool of the longest staple. The subjoined cut will sufficiently illustrate this point.



The upper figure represents a lock of Saxon wool; the lower one is the delineation of a lock of Leicester wool, from a sheep of the improved breed.

* Pennant's Tour to the Hebrides.

† Pliny, Nat. Hist., Book VIII. Ch. 48. The author speaks of the use of felted goods a very little before his time, even among the higher classes of society in Rome. "As or our mantles, frized deep both within and without, they were invented, and came to use first, no longer since than in my father's days, as also those hairy counterpanes and carpets: for the stuffed cassocks that senators and noblemen of Rome do wear begin but newly to be woven."—Ibid.

The spirally-curling form of wool used, but erroneously, to be considered as the chief distinction between the covering of the goat and the sheep; but the under coat of some of the former is finer than any sheep, and it is now acknowledged frequently to have the crisped and curled appearance of wool. In some breeds of cattle, particularly in one variety of the Devons, the hair assumes a curled and wavy appearance, and a few of the minute spiral ringlets have occasionally been seen. It is the same with many of the Highlanders, but there is no determination to take on the true crisped character and throughout its whole extent, and it is still nothing but hair. On some foreign breeds, however, as the yak of Tartary, and the ox of Hudson's Bay, some fine and valuable wool is produced.

There is an intimate connexion between the fineness of the wool and the number of the curves, at least in sheep yielding wool of nearly the same length; so that whether the wool of different sheep is examined, or that from different parts of the same sheep, it is enough for the observer to take notice of the number of curves in a given space, in order to ascertain with sufficient accuracy the fineness of the fibre. M. Lafoun has published an account of the management of the German Merino sheep at Hohenheim in Wurtemburg, and Schleisheim near Munich. He says that the whole flock is inspected three times in the year—before winter, when the selection of lambs is made, in the spring, and at shearing time. Each sheep is placed in its turn on a kind of table, and examined carefully as to the growth, the elasticity, the pliability, the brilliancy, and the fineness of the wool. The latter is ascertained by means of a micrometer. It being found that there was an evident connexion between the fineness of the fibre and the number of the curves, this was more accurately noted, and the following table was constructed. The fleece was sorted in the manner usual in France. The fineness of the superelecta, or picklock, is represented by a space corresponding with the number 7 on the micrometer; if this is (which will hereafter appear to be the case) equivalent to 1-840th part of an inch, and that fibre contains from 27 to 29 curves, the table will easily be understood:—

Sort.	Name.	Curves in an inch.	Diameter of fibre.
1	Superelecta	27 to 29	7 or 1-840th of an inch.
2	Electa	24 to 28	8 or 1-735th "
3	Prima	20 to 23	9 or 1-660th "
4	Secunda Prima	19 to 19	10 or 1-588th "
5	Secunda	16 to 17	11 or 1-534th "
6	Tertia	14 to 15	11½ or 1-510th " *
7	Quarta	12 to 13	

Sufficient attention has not been paid by the breeder to this curled form of the wool. It is, however, that on which its most valuable uses depend. It is that which is essential to it in the manufactory of cloths. The object of the carder is to break the wool to pieces at the curves—the principle of the thread is the adhesion of the particles together by their curves; and the fineness of the thread, and consequent fineness of the cloth, will depend on the minuteness of these curves, or the number of them which are found in a given length of fibre.

The wavy line in the above cut has a pretty appearance, even in the Leicester; but the close spiral curls of the Saxon wool deserve particular attention. The person most uninformed on these subjects will see at once why the Leicester wool is unadapted to clothing purposes. The particles into which it is broken by the card could have little or no coherence—the greater part would be dissipated in the operation—and the remaining por-

* Annales de l'Agriculture Française, 1832.

tions could not be induced so to hook themselves together as to form a thread possessing the slightest degree of strength. On the other hand, the close curls of the Saxon explain the reason why, on one account at least, it is placed at the head of clothing wools.

It will readily be seen that this curling form has much to do with the felting property of wool. It materially contributes to that disposition in the fibres which enables them to attach and entwine themselves together; it multiplies the opportunities for this interlacing, and it increases the difficulty of unravelling the felt. Still, however, it is only that form of the fibre which affords the fairest opportunity for the exertion of the true felting power. It assists, and very effectively, in producing the phenomena of felting, but it is not the principal agent concerned.

THE FELTING PROPERTY OF WOOL RESUMED.

A reference to some well-known process in the manufacture of wool will be advantageous. The hatter takes a certain quantity of wool cut into short lengths, and with an instrument resembling a bow, he beats and tosses them about until he has completely separated them from each other, and they lie in all kinds of directions, and he has got a layer of them of sufficient thickness for his purpose. He then moistens them and covers them with a cloth, and presses them and moves them about backwards and forwards in every direction, until he finds that they are working themselves into a compact mass. In proportion as this mass is formed, he increases the pressure until it acquires the firmness that he wishes.

The cloth merchant weaves his cloth; but he has been compelled to use a considerable quantity of oil in the manufacture of it which must be got rid of; and, at the same time, his fabric is too open and the threads are too apparent to suit with the fashion of the times, or to be as smooth and soft and comfortable in wearing as it is required to be. He sends it to the fulling mill. It is put into a large trough with water, in which some argillaceous earth has been dissolved, and which combines with the oil, and gets rid of it in the form of soap. In order that this argillaceous earth may penetrate every part of the cloth, and every particle of the grease be removed, the fabric is passed rapidly and repeatedly through tight rollers, and then, fresh water being let in upon the cloth, (the process through the rollers still continuing,) it is washed perfectly clean.

The cloth is now put into the fulling-mill or stock, a certain quantity of soap being first carefully and evenly laid on it. By the joint influence of the moisture and the pressure, certain of the fibres of the wool are brought into more intimate contact with each other; they cohere: not only the fibres but, in a manner, the threads cohere, and the cloth is taken from the mill shortened in all its dimensions; it has become a kind of felt, for the threads have disappeared, and it can be cut in every direction with very little or no unravelling; it is altogether a thicker, softer, warmer fabric.

One more illustration from domestic life. The worsted stockings and the flannels!—for a while after their purchase they are observed to undergo a slow process of shortening or contracting every way at each washing; but the good housewife, taking care that they shall never soak long in water, and that no very hot water shall, by any chance, come in contact with them; and that, a liberal quantity of soap being allowed, they are washed as quickly as it can be effectually done, and immediately wrung well, and heartily shaken and stretched, and suspended by their extremities, instead of being carelessly thrown across the line—contrives they shall be tolerably worn out before they shrink to any inconvenient degree. In her absence, however, or contrary to her directions, the washerwoman, in

order to save herself some labour, suffers them to soak during some hours in hot water, or perhaps boils them. The immediate consequence of this is, that they all at once shrink to such an extent as to be nearly or quite useless; and when the articles are examined the threads are found to have been brought closer together, the material has been thickened, and a kind of matted or felted substance has been produced.

THEORIES OF FELTING.

Many an ingenious theory has been brought forward in order to account for this process. To the natural philosopher nothing was more easy of explanation. It was the attraction of cohesion; it was that power by which the particles of all bodies, when brought within insensible distances, are held together; it was an illustration of that universal law by which the system rolls entire. Take two leaden bullets; scrape a small portion from each; bring the smooth surfaces, although but of little extent, together; press them together with a kind of twist, and they cohere. Bring two plates of glass together perfectly level and clean, and they will adhere with considerable force. So the fibres of the wool, in these manipulations, were supposed to be brought within the sphere of each other's attraction, and to have cohered. "The reason of the contraction of the cloth in felting," says Dr. Young, "is probably this, that all the fibres are bent by the operation of the hammers but not equally, and those that have been the most bent are prevented by their adhesion to the neighbouring fibres from returning to their original length."* In another place his language is stronger and more intelligible. "Monge thinks that the hairs are united by projecting serrations or filaments; but this supposition is not necessary in explaining the adhesion of felts, which may be deduced from the force of friction alone."† Mr. Luccock is inclined to adopt this opinion. He says, "We know too little at present to enable us to assign the cause of this permanent contraction; but conjecture that it is owing to the particles of the thread which are brought into actual contact with each other, cohering exactly upon the same principle as the leaden balls do in the common experiment, so often exhibited in lectures upon natural philosophy to illustrate the attractive power of bodies."

It was forgotten, however, that this attraction of cohesion can take place only at insensible distances, and that the interposition of the smallest substance, a single hair, or the minutest film of water, prevented the display of it; yet the felting property of the wool, if the presence of moisture were not absolutely necessary to it, was best displayed when the fabric was immersed in water. There was no answer to this, and the philosophical explanation of the felting of wool was abandoned by every practical man.

The presence of some fluid is connected with the usual development of the felting property. It was said to be the effect of moisture to shorten both the vegetable and animal fibre. This, however, is not the fact; single filaments, whether vegetable or animal, lengthen under the influence of moisture. The hygrometer is sometimes composed of a single hair attached to a delicate string; and even a collection of straight fibres obey the same law. The husk of the oat—the principle of the weather-house—is an illustration of this; a leathern thong also is extended by being wetted. The moisture enters into the pores of these bodies, and forces the particles of which they are composed farther from each other.

On a twisted cord the effect is different; by the very entrance of the moisture between the pores of the fibres of which the cord is composed, the

* Young's Natural Philosophy, vol. i. p. 186.
† Ibid., vol. ii. p. 190.

diameter of each coil must be increased and the cord must consequently be shortened. The village hygrometer—no bad indicator of the weather—the piece of cord that has been soaked in salt water, and the little weight appended to the centre of it, will illustrate the present subject. When the air is parting with a portion of its water, and rain is likely to follow, the salted cord absorbs the moisture and contracts, and the weight rises. So also the *animal* twisted fibre—the string of the violin, or of the piano-forte—contracts in wet weather so forcibly that it breaks. In this way the felting of the cloth in the fulling-mill, and the contraction of the flannel and the stocking, may be readily accounted for; the twisted thread does contract, its coils enlarge, and the whole is shortened. The manufacturer, therefore, very naturally calls in the aid of moisture, in order to increase the effect of his pressure and beating, or to commence that motion among the fibres of the wool which he afterwards carries to a greater extent.

Still the phenomena of felting are not accounted for. The weather becomes dry, and the husk of the oat again shortens, and the cord of the village hygrometer lengthens, and the weight again descends, the string of the musical instrument, if it has not been broken by the violence of the contraction, lengthens and gives a graver sound; but nothing can restore the former length and elasticity of the stocking, or unravel the felting of the hat or the cloth. The forming of these dense masses may have been assisted by the action of moisture and pressure and beating on the woolly fibre or the threads or little accumulations of it, but there is another principle at work for which search must be made.

A GLIMPSE AT THE TRUE PRINCIPLE.

There is one circumstance of very common observation: if a filament, or a small collection of filaments of the finest wool, is drawn through the finger and thumb, in a direction from the root to the extremity, it is evident that the surface of the fibre is smooth and polished; but if the direction is reversed, a little more force is requisite, and it seems as if some rough, and bristled, and serrated body were drawn through. This simple experiment has been made a thousand times, and invariably with the same result; yet when the fibre was examined by means of the best microscope, not the slightest irregularity of surface could be discovered.

It could not, however, be doubted that this peculiar sensation communicated to the fingers, when a fibre of wool or hair was drawn between them in a direction from the extremity to the root, was connected with the felting property of wool; and a few of those who were concerned with the manufacture of this material, and some philosophic inquirers who condescended to apply the principles of science to the elucidation of facts so humble as this, anxiously employed themselves in developing the principle on which the felting of wool was founded.

Mr. Bakewell imagined that the roughness, or tremulous motion felt in drawing a hair through the fingers, might "be caused by minute vibrations, more easily excited in one direction than another, owing to the peculiar arrangement of the particles, or of the small filaments which compose the substance of wool or hair." This motion he compared to that of an "ear of barley placed under the sleeve of the coat, with the points of its beards downwards. By the action of the arm the ear is moved in a retrograde direction, until it has advanced from the wrist to the shoulder *."

It is sufficient to observe that this account of the matter is exceedingly

* Bakewell on Wool, p. 105.

unsatisfactory. It explains neither the cause of the vibrations, nor the facility with which they are propagated in one direction rather than another; and the uniform progression of the ear of barley, in a direction from the point to the base has nothing to do with any vibratory motion whatever. The extremities, or the serrated edges of the beard, entangling with the clothes, or burying themselves in the flesh, forbid any progression forward, when, by every action of the arm, the ear is pressed between it and the clothes, and it elongates in the direction of the stem alone, where there is no opposition. The pressure ceasing, and the ear, by means of its inherent elastic power, recovering, or endeavouring to recover, its former curved form, is drawn back a portion of the way that it had travelled, but the beard is also drawn forward, neither the points nor the serrated edges now offering opposition, and thus a little ground is gained; and by the repeated action of the arm, the barley travels in a direction towards the stem. This onward journey of the ear, in one direction only, and that with the root forwards, is attributable to the points and serrated edges of the beard, and to them alone.

Reflections of a similar nature induced those who had anxiously studied the phenomena of felting to imagine that the fibres of wool, when brought into close contact with each other, moved with facility in one direction alone; and having been pressed to a certain distance into a mass of other fibres, were in a manner fixed there: and they thought that they could best, or could only account for this, by the supposition that the fibres had an irregular and serrated surface.

"Respecting," says Mr. Thomas Plint, in a letter to the author, "the application of the microscope to the examination of the fibre, I am decidedly of opinion that a careful and minute examination of wools differing in their felting properties would issue in the detection of some specific difference of structure. This property is altogether inexplicable, at least in my mind, except on the supposition that the extreme surface of the fibre is irregularly *feathered*, and that, by compression, these feathered edges become entangled and locked together. These feathers must also point in one direction, viz., from the root to the extremity of the fibre; and if we suppose the feathered edge, or, more properly speaking, the individual tooth or feather, to be of a firm texture, it is evident that one tooth being pushed into another, would fasten like a wedge; and if we further suppose that the tooth or feather has a barb, similar to that on a whale-harpoon, the phenomena of felting are explained."

M. Monge, a French chemist, was the first who ventured to assert that this must be, and is, the actual structure of wool; that "the surface is formed of lamellæ, little plates which cover each other from the root to the point, pretty much in the same manner as the scales of a fish cover that animal from the head to the tail, or like rows placed one over the other, as is observed in the structure of horns*." Considering this to be not only probable, but in a manner certain, he goes on to describe the mechanism of felting as accurately as if he had seen the serrated edge of the wool. The workman is supposed to be preparing to make the felt which is to constitute the substance of the hat. "He presses the mass with his hands, moving them backwards and forwards in various directions. This pressure brings the hairs against each other, and multiplies their points of contact. The agitation gives to each hair a progressive motion towards the root; but the roots are disposed in different directions—in every direction; and the lamellæ of one hair will fix themselves on those of another hair, which happens to be directed a contrary way, and the hairs become twisted toge-

* Annal. de Chimie, vol. vi. p. 300.

ther, and the mass assumes that compact form which it was the object of the workman to produce. In proportion as the mass becomes compact, the pressure of the hands must be increased, not only to make it closer, but also to keep up the progressive motion and twisting of the hairs which then takes place with greater difficulty. Throughout the whole of this operation the hairs fix themselves only to each other, and not to the cloth, the fibres of which are smooth, and not disposed to felting."

One extract more from Monge, for he should not be robbed of a particle of the honour which is his due. The cloth is supposed to be carried to the fulling-mill. "The scouring of the cloth is not the only object in fulling it. By the alternate pressure given by the mallets to a piece of cloth, especially when the scouring is pretty far advanced, an effect is produced analogous to that of the hands of the workman on the felt of the hat. The fibres which compose one of the threads, whether of the warp or the woof, assume a progressive movement; they introduce themselves among those of the threads nearest to them, and thus by degrees all the threads become felted together, the cloth is shortened in all its dimensions, and partakes both of the nature of cloth and of felt*."

MICROSCOPIC APPEARANCE OF HAIR AND WOOL.

Since the arrangement of the lenses in the achromatic microscope has so much increased the power of defining, if not of magnifying things by means of that instrument, the intimate structure of many interesting objects has been discovered and depicted. The long hair of the bat has exhibited a cylinder, round which a spiral projection has run like a riband, from the root to the extremity. The shorter hair or fur, or, more properly speaking, wool of the same animal, has been shown to resemble a succession of joints in the form of inverted cones—the apex of the superior one being

* This explanation of the felting principle was, however, far from being generally received by the French philosophers, MM. Perrault de Jotemps, Fabry, and Girod de l'Ain, in their work on wool already referred to (p. 68), bring forward a very different and unsatisfactory theory. "Felting," say they, "is the property which certain hairs and vegetable filaments have of attaching themselves more and more to each other in proportion as the fabric in which they are united is beaten. The action of the hammers produces three effects—to straighten, to force out, or to break the filaments of which it is composed; the consequence of which is the development of that kind of elasticity which consists in the disposition or attempt of the fibre to regain its previous undulated form—that elasticity by which it returns to its original length, and especially excited by the fragments when the fibre is broken under the hammer. The effect of the hammer will be felt by the fibres in the interior of the thread. The hammer being raised, they will endeavour to regain their previous form; and the various circlets all acting under the influence of the same principle of elasticity, will entangle themselves with one another; and so the felting process will commence in the centre of the thread. In the same way, the outer filaments, compressed and lengthened under the hammer, will unite with each other, as, by their elastic power they are endeavouring to regain their former shape; and, the threads being close to each other, the filaments of one will become entangled with those of its neighbour, and thus felting will extend through the whole substance of the cloth. If it should so happen that any of the filaments are broken by the hammers, the felting power will be more strikingly apparent; for the fragments, loosened from their adhesions, and springing into their former curves, cannot fail of entangling themselves intimately and deeply with all the particles around them."—*Nouveau Traité*, p. 52.

Felting, then, according to these gentlemen, depends on the curved form of the wool, and the elastic principle by which it endeavours to regain that form, after having been straightened under the hammer. The curved form of wool doubtless assists materially in the production of felting, for it multiplies the opportunities for the entanglement of the fibres; and the tendency to take on again the crumple shape, when that has been forcibly changed, is another agent to which much may fairly be attributed: but these will not alone satisfactorily account for the phenomena that take place. They afford, as has been already observed, opportunity for the exertion of the felting power; but that power is yet to be sought for, or was first rightly guessed at by Monge.

received into the cup or half-excavated base of the inferior one: and thus most satisfactorily accounting for the great pliability of this material, and for the perfection of its felting property when tried on the small scale of which it is capable. This is plainly shown in the first figure of the cut at p. 88.

The hair of the human being has been very carefully examined. Mr. Gill gives a figure of it, as being of a cylindrical form, and covered with scales or roughnesses *; but Dr. Goring thus describes it:—"a hair viewed on a dark ground is seen to be indented with teeth, somewhat resembling those of a coarse, round rasp, but extremely irregular and rugged. These incline all in one direction like those of a common file,—viz., from the origin of the hair towards its extremity †," thus accounting well for the occasional harling or matting of the hair when subject to pressure, especially towards the poll of the head. It is to be regretted that Dr. Goring did not make a drawing of this appearance of the hair; for his account of it would then have had much greater weight. It is singular that, although nine years have passed, and the microscope has been considerably improved since Dr. Goring observed this structure of the hair, and almost every one who possessed an instrument of much power has been eager to gaze on this new discovery, no person has been so fortunate as to detect a single serration on its edge.

These philosophers, however, seem scarcely to have directed their examinations and inquiries to those useful purposes which ought at once to have suggested themselves to their minds. The fur of the mouse, with its singular openings through the external crust,—the inverted cones of the bat were admired; but the woolly covering of the sheep, the basis of the staple manufacture of the kingdom,—evidently possessing such different properties in different breeds, and producing fabrics so strangely different in their substance and their use,—attracted no attention. It would have been unpardonable if the writer of this treatise had not anxiously inquired what assistance could be derived, by means of the newly improved optical instruments, on these points of paramount importance,—the intimate structure of the filaments of wool—the possibility of obtaining a clue to the cause of the felting property generally, and the various degrees in which it existed in the numerous domestic and foreign breeds.

THE DISCOVERY OF THE IRREGULAR SURFACE OF THE WOOL.

Although the microscope which he used was well constructed, and of great power, and the optician to whom it belonged had the kindness to superintend the adjustment of the lenses and the objects and the more difficult management of the light, the author was completely disappointed in his first attempts to discover the minute structure of the fibre. Nothing was to be seen but a semi-transparent polished trunk, with a few branches sprouting from it, and beautifully reflecting the light,—a little larger in some places than in others, and particularly where these branches sprouted; there were several wavy, indistinct marks, but not sufficient to authorize him to conclude, or even suspect, that they were connected with irregularities, much less serration of surface. He tried various wools—those remarkable for their felting property, and others that possessed it in a much slighter degree,—and there was no difference but in the bulk of the fibre, the degree of transparency, and the occasional enlargements of the trunk where the offsets grew. After having wearied the optician and himself, the author retired, having previously obtained a promise from this gentleman that he would subject the fibres to the test of another instrument possessing

* Gill's Technological Repository, vol. iv. p. 130.
† Brande's Quarterly Journal, 1826, p. 433.

even superior power of defining objects. A few days afterwards he had the mortification to receive a letter from the optician, containing the following passage:—"Agreeably to your request, I have again examined the specimens of wool, and with a still higher power than when you were here. The result is precisely the same; there is no appearance whatever of indentations upon the edges, and the only difference I found was, that the markings we observed upon the surface were more distinctly made out, and had more the wavy appearance than before. I am satisfied that the hair is round and cylindrical. If there were any indentations upon the edges, they would surely be seen by the microscope I now used."

The author would now have probably relinquished the inquiry in despair, and contemplated this portion of his subject as necessarily unsatisfactory, and probably erroneous. Speculation—perhaps idle, and unsubstantial theory—would mingle with that which ought to be a plain narration of facts. In the mean time, however, he had been introduced to an artist extensively engaged in the manufacture of achromatic microscopes, the lenses of which were ground and polished under his own immediate inspection—Mr. Powell, of Clarendon-street, Somers Town, London. With much good nature he devoted a portion of his valuable time to the pursuit of this new inquiry; and, after various trials, and much skilful management, succeeded in displaying the irregular edges of a fibre of Merino wool. The power which was then used was not sufficiently high; and, although the serrated edge was evident—it was impossible that we could be deceived—yet the irregularities were minute, and the outline faint. The further examination of the subject was adjourned until a lens had been procured of less focal distance and greater defining power.

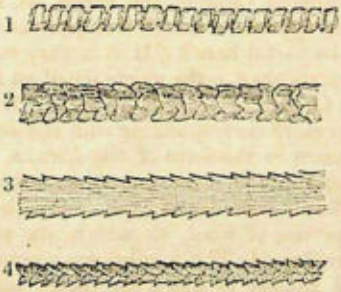
THE FIRST PUBLIC VIEW OF THE SERRATED EDGE OF WOOL.

The author of this work may have formed somewhat too sanguine expectations of the important consequences that will result from the discovery of the structure of the fibre of wool; at all events, he is anxious to place the record of it beyond the possibility of denial or doubt.

On the evening of the 7th of February, 1835, Mr. Thomas Plint, woollen manufacturer, resident at Leeds; Mr. Symonds, clothing agent, of Cateaton-street, London; Mr. T. Millington, surgeon, of London, an esteemed friend; Mr. Edward Braby, veterinary surgeon, at that time assisting the author in his practice; Mr. William Henry Coates, of Leeds, veterinary pupil; Mr. Powell, the maker of the microscope, and the author himself, were assembled in his parlour. The instrument was, in Mr. Powell's opinion, the best he had constructed; he had sold it to a gentleman, but now borrowed it for this purpose. A fibre was taken from a Merino fleece of three years' growth; the animal was bred by and belonged to Lord Western. It was taken without selection, and placed on the frame to be examined as a transparent object. A power of 300 (linear) was used, and the lamp was of the common flat-wicked kind. The focus was readily found; there was no trouble in the adjustment of the microscope; and, after Mr. Powell, Mr. Plint had the first perfect ocular demonstration of the irregularities in the surface of wool,—the palpable proof of the cause of the most valuable of its properties,—its disposition to felt.

The fibre thus looked at assumed a flattened riband-like form. It was of a pearly grey colour, darker towards the centre, and with faint lines across it. The edges were evidently hooked, or more properly, serrated—they resembled the teeth of a fine saw. These were somewhat irregular in different parts of the field of view, both as to size and number. The area of the field was now ascertained; it was one-fortieth of an inch in dia-

meter. By means of the micrometer we divided this into four, and we then counted the number of serrations in each division. Three of us counted all four divisions, for there was a difference in some of them. The number was set down privately, and it was found that we had all estimated it at fifteen in each division. Having multiplied this by four, to obtain the whole field, and that by forty, the proportionate part of an inch of which the field consisted, we obtained a result which could not be disputed, that there were 2400 serrations in the space of an inch, and all of which projected in the same direction, viz., from the root to the point. Then, before we quitted the examination of the fibre as a transparent object, we endeavoured to ascertain its actual diameter, and proved it to be $\frac{1}{1\,3\,0}$th of an inch.



[*The Bat's Hair and Wool. The Long Merino Wool.*]

1. The hair of a bat, as exhibited by the microscope.
2. The wool of do.
3. A fibre of long Merino wool, viewed as a transparent object.
4. Ditto, as an opaque one.

We next endeavoured to explore the cause of this serrated appearance, and the nature of the irregularities on the surface, which might possibly account for the production of these tooth-like projections; we therefore took another fibre, and mounted it as an opaque object. There was considerable difficulty in throwing the light advantageously on the fibre, so small a space only as $\frac{1}{3\,0}$th of an inch intervening between the lens and the object. At length Mr. Powell perfectly succeeded, and we were presented with a beautiful glittering column, with lines of division across it, in number and distance seemingly corresponding with the serrations that we had observed in the other fibre that had been viewed as a transparent object. It was not at once that the eye could adapt itself to the brilliancy of the object; but by degrees these divisions developed themselves, and could be accurately traced. These were not so marked as the inverted cones which the bat's wool presented, but they were distinct enough; and the apex of the superior one, yet comparatively little diminished in bulk, was received into the excavated base of the one immediately beneath, while the edge of this base formed into a cup-like shape, projected, and had a serrated, or indented edge bearing no indistinct resemblance to the ancient crown. All these projecting indented edges pointed in a direction from root to point.

Whether these, like the cones of the bat, are joints, or at least points of comparative weakness, and thus accounting for the pliancy and softness of the fibre, or regulating the degree in which these qualities exist, may perhaps be better determined by and by: one thing, however, is sufficiently

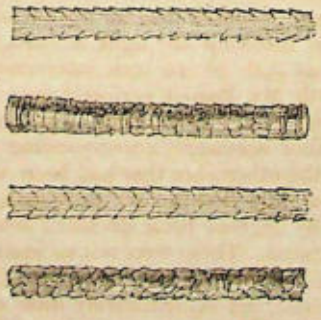
plain, that these serrated edges in the transparent object produced (when the fibre was resolved into its true form as an opaque one) by the projecting edges of the cups, or hollowed bases of the inverted cones, afford the most satisfactory solution of the felting principle that can be given or desired. The fibres can move readily in a direction from root to point, the projections of the cups offering little or no impediment, but when they have been once involved in a mass, and a mass that has been pressed powerfully together, as in some part of the manufactory of all felting wool, the retraction of the fibre must be difficult, and in most cases impossible *.

THE USE OF THE MICROSCOPE EXTENDED.

The felting property of wool is the most important as well as the distinguishing one; but it varies essentially in different breeds, and the usefulness and the consequent value of the fleece, at least for clothing purposes, depends on the degree in which it is possessed. Will our microscopical observations be useful here? It is a very curious and interesting point that has been established,—the existence of an irregularity of form in the wool, accounting for and necessarily giving it a felting power,—is there a variation in this structure corresponding with the degree of felting power? If there is this difference in the form of the fibre, a method has been discovered, expeditious and certain, and superior to any yet known, of judging of the qualities of different samples of wool,—or rather, it is the only mode by which those properties of wool, on which its value chiefly depends, can be thoroughly ascertained. This inquiry was commenced very cautiously, and with a degree of anxiety of which the reader will now be able to form some adequate conception.

COMPARISON OF THE STRUCTURE OF DIFFERENT WOOLS WITH THE FELTING PROPERTY.

A fibre of Saxon wool was set up as a transparent object. This sheep is originally a Merino, but the fleece is much improved by careful management. Its felting property is superior to that of the Merino, and for some purposes it is more highly valued. The following cut exhibits the result.



[*Saxony Wool.*]

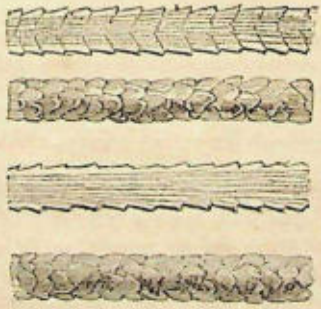
1. A fibre of Saxon wool as a transparent object.
2. Ditto, opaque.
3. Ditto, combed, transparent.
4. Ditto, combed, opaque.

* The discovery of the real structure of wool will throw much light on a circumstance familiar to every reader, viz., the different sensation imparted by the contact of linen and woollen cloths with the skin. No one would be so absurd as to apply flannel to a wound

It is evidently a finer wool than the Merino; it is $\frac{1}{1}\frac{1}{0}$th part of an inch in diameter. The serrations are as distinct; they are not quite so prominent, yet there is not much difference in this respect, and certainly not greater than the difference in the bulk of the fibre would produce. There is a little more irregularity in the distribution of the serrations; and after careful counting, there is an average of seventeen in each of the four divisions of the fibre. This number multiplied by four will give sixty-eight as the whole number in the field of view, and that multiplied by forty will yield a product of 2720, the number of irregularities in the edge of the fibre in the space of an inch.

It is next viewed as an opaque object, and presents nearly the same appearance as the long Merino. The cups answer in number to the serrations, their edges project, and there is also an indication of a serrated edge; but as the fibre, and consequently the cup is smaller, it is not so deep as in long Merino.

The next cut gives the microscopical appearance of some South Down wool of a very fair and good quality. This is an exceedingly useful wool; but, on account of its inferior felting power, rarely used in the manufacture of fine cloths; in fact, it has been superseded by that which has been just described, and others of a similar quality.



[*South Down Wool.*]

1. A fibre of South Down wool as a transparent object.
2. Ditto, ditto, as an opaque.
3. Ditto, combed, transparent.
4. Ditto, combed, opaque.

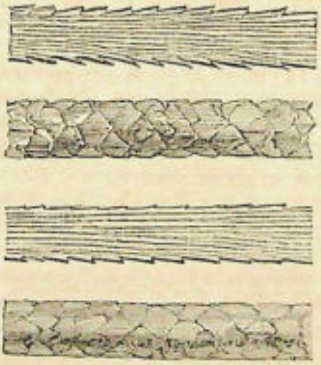
The fibre is evidently larger; it is the $\frac{1}{8}\frac{1}{0}$th part of an inch. The serrations differ in character; these are larger, but they are not so acute, they almost appear as if they had been rounded; they have a rhomboidal, and not a hooked character, and they are evidently fewer in number in the same space. There are thirteen in each division, making, according to the mode of multiplication already pursued, 2080 serrations in an inch, or 640 less than the Saxon.

It is made an opaque object; the cups answer in number to the serra-

or excoriated surface; not from any chemical effect that the wool has on the sore, but because the sharp and hooked edges, furrowing the wound, could not fail of increasing the irritation of the part to a painful and dangerous degree. It will no longer be surprising that new flannel, and especially when manufactured from a harsh species of wool, is often so unpleasant to wear, until either the skin gets accustomed to the irritation of all these protruding hooks, or they are gradually blunted or broken off. The advantage frequently derived from wearing flannel will also be apparent, for the *carding* produced by all these tiny points cannot fail of producing a glow on the skin, and a healthy determination of blood to it.

tions ; they are more regularly distributed,—they are not so prominent ; and they show, what is now seen for the first time—the fibre being larger—that the cup is not composed of one continuous substance, but of numerous leaves, connected together, and probably overlapping each other. The serrations which were observed in the edge of the cups in the long Merino and the Saxon, are here resolvable into small leaves (three are visible) ; the vacancy, or angle between the tops of them not being of any considerable depth.

The next wool that was subjected to examination was the Leicester ; the unrivalled British long wool, and as useful, as indispensable for some purposes, as the finer wools already described are for others ; and possessing, and therefore the better adapted for its own purposes, the felting property, to a comparatively little extent.



[*The Leicester Wool.*]

1. A fibre of Leicester wool, as a transparent object.
2. Ditto, ditto, an opaque one.
3. Ditto, combed, transparent.
4. Ditto, ditto, opaque.

The fibre is considerably larger; it is $\frac{1}{2500}$th of an inch. On account of its bulk, the little wavy lines about it give more decided indications of irregular external structure. The serrations are superficial,—irregular, differently formed in different parts—a few like small spines, not projecting far from the surface, but running along it ; other prominences are more rounded, and occasionally they give the idea of lying one upon another, as if two rods had been spliced together, with the end of one projecting beyond the other. They were evidently fewer in number ; each quarter of the field contained but eleven, amounting to only 1860 in the space of an inch, or 220 less than the Southdown.

As an opaque object, the cups corresponded in number with the serrations and the construction of the cup is more evident. It consists of from four to six leaves, rounded at the extremity, and with only a short point or spine protruding, and the leaves evidently lying closer to the body of the fibre.

CONCLUSIONS.

There can no longer be a doubt with regard to the general outline of the woolly fibre. It consists of a central stem or stalk, probably hollow, or at least porous, and possessing a semitransparency not found in the fibre of hair. From this central stalk there springs at different distances, in different breeds of sheep, a circlet of leave-shaped projections. In the finer species of wool these circles seemed at first to be composed of one indented,

or serrated ring; but when the eye was accustomed to them, this ring was resolvable into leaves, or scales. In the larger kinds the ring was at once resolvable into these scales, or leaves, varying in number, shape, and size, and projecting at different angles from the stalk, in the direction of the leaves of vegetables, from the root to the point, or farther extremity. In the bat there seemed to be a diminution in the bulk of the stalk, immediately above the commencement of the sprouting of the leaves, and presenting the appearance of the apex of an inverted cone received in the hollowed cup-like base of another immediately beneath. The diminution in the fibre of the wool at these points could be only indistinctly perceived; but the projection of the leaves gave a somewhat similar cone-like appearance. The extremities of the leaves in the long Merino and the Saxon wool were evidently pointed, with acute indentations or angles between them. They were pointed likewise in the Southdown, but not so much, and the interposed vacuities were less deep and angular. In the Leicester the leaves are round, with a diminutive point or space. Of the actual substance and strength of these leafy or scaly circles nothing can yet be affirmed; but they appear to be capable of different degrees of resistance, or of entanglement with other fibres, in proportion as their form is sharpened, and they project from the stalk, and in proportion likewise as these circlets are multiplied. So far as the examination has hitherto proceeded, they are sharper and more numerous in the felting wools than in others, and in proportion as the felting property exists. The conclusion seems to be legitimate, and indeed inevitable, that they are connected with, or, in fact, that they give to the wool the power of felting, and regulate the degree in which that power is possessed.

If to this is added the curved form which the fibre of the wool naturally assumes, and the well-known fact, that these curves differ in the most striking degree in different breeds, according to the fineness of the fibre, and, when multiplying in a given space, increase both the means of entanglement and the difficulty of disengagement, the whole mystery of felting is unravelled. A cursory glance will discover the proportionate number of curves, and the microscope has now established a connexion between the closeness of the curves and the number of the serrations. The Saxon wool is remarkable for the close packing of its little curves; the number of serrations are 2720 in an inch. The South Down wool has numerous curves, but evidently more distant than in the former sample; the serrations are 2080. In the Leicester the wavy curls are so far removed from each other, that a great part of the fibre would be dissipated under the operation of the card, and the serrations are 1860; and in some of the wools which warm the animal, but were not intended to clothe the human body, the curves are more distant, and the serrations are not more than 480. The wool-grower, the stapler, and the manufacturer, can scarcely wish for better guides.

Yet there is no organic connexion between the curve and the serration; the serrations are not the cause of the curve, nor do the curves produce the serrations; the connexion is founded on the grand principle that the works of nature are perfect, that no beneficial power is bestowed without full scope for its exercise. The curves of the smooth fibre might entangle to a considerable degree, but some of the points would be continually unravelling and threatening the dissolution of the whole felt. The straight fibre, however deeply serrated, its root being introduced into the mass, would often pass on and pass through the felt and be lost. It is by the curved form of the jagged fibre that the object can be accomplished certainly and perfectly.

Future observers may possibly detect in wool the apparent coned and

jointed structure of the hair of the bat, and then a third and powerful principle would be called into action, the pliability of the fibre, the ease with which it is bent in every different direction, and in each becomes more inexplicably entangled. A great point, however, is gained by the knowledge that in proportion as the auxiliaries in the felting process are multiplied, the direct agents are also increased.

As the work proceeds, the author will endeavour to give the microscopic character of the wool of the different varieties of British sheep, and of most of the foreign ones; it will be for the breeder and the manufacturer to build on the foundation which he is attempting to lay, and to draw those practical and valuable inferences which such statements will naturally suggest *.

OTHER WOOL-BEARING ANIMALS.

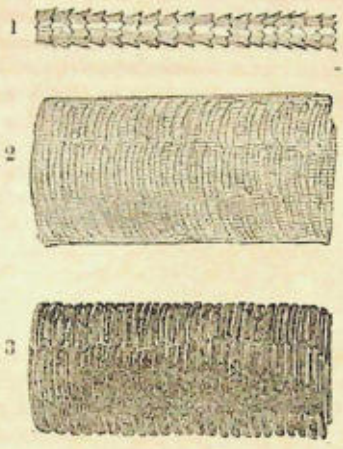
It has been stated (page 56) that the number of wool-bearing animals is much greater than has been commonly imagined. The consideration of the clothing of one or two of them, most frequently employed in the manufacture of certain articles of dress, will show the importance of the inquiry into the structure of wool, and the immense extent to which it may hereafter be carried.

The fur, as it is called, of the hare, the rabbit, the beaver, the otter, and a variety of animals, used in the manufacture of hats, and various other felts, is composed, like the covering of the wild or undomesticated or neglected sheep, of a mingled mass of hair and wool: the hair being of different lengths in different animals, but in all of them extending over, and lying upon, and protecting the wool; and the wool differing in length, closeness, and value in different animals, and differing as materially, or even more so, in the same animal, according to the season of the year, the degree of cold, and the general state of the weather. "The weather," says an intelligent writer, "has great influence on the quality and quantity of furs imported from all quarters of the globe; and this circumstance renders the fur trade more difficult, perhaps, and precarious, than any other: not only the quality, and consequently the price of many furs, will differ every year; but I have often seen the same article rise and fall 100, 200, and 300 per cent. in the course of a twelvemonth: nay, several instances in the space of one month only†."

* "I am of opinion," says Mr. Plint, in one of the kind and valuable letters which the author received from him, "that if you had samples of different species of wool, Saxony, Spanish, and Odessa, as foreign wools; and of Norfolk, Southdown, and Ryeland, as English wools, with an accurate statement of the respective properties of each, you might then, by a careful examination of the fibre, discover some peculiarity of structure on which the properties respectively depended. The greater your variety of wools, and the more accurate the description of the manufacturing properties, the more likely would you be to come at some general conclusions. For instance, I am inclined to think that you would find the felting properties greatest in wools the fibres of which had a great number of curves; and I apprehend, also, that the feathered, or jagged character of the fibre has a close connexion with the number and character of the curves."

The discovery has been made. Many pleasing feelings will be associated with the recollection of that evening when the serrated edge of the fibre of wool was first seen by a small circle of the author's friends, and among whom, as has been already stated, was Mr. Plint, who happened then to be in London. If a veterinary surgeon chanced to be the fortunate discoverer, why, it will show that he is, or is capable of being, far more intimately connected with the agriculture and the prosperity of his country, than many have supposed him to have been, or than perhaps he actually has been; and it will more plainly point out to him the path of duty. That path will be pursued in the present work, so far as opportunity will serve; but it will be for some more practical man (and who better than Mr. Plint himself ?) to take up the theme, and follow it through all its important, invaluable consequences.

† M'Culloch's Dictionary, Art. "Fur Trade."



[*The Wool of the Rabbit.*]

1. The wool of the rabbit opaque. 2. The hair of the rabbit, transparent. 3. Ditto opaque.

This is selected, as most easy to be obtained, and the use of the fur being best known. When the skin is examined, the long, straight, strong, and yet fine and soft, hairs, constituting the apparent coat of the animal, are sufficiently evident; but when this external covering is blown aside, a shorter, softer, crisped, curved fibre is immediately perceived, with every characteristic of true and perfect wool.

These substances were put to the test of the microscope. The wool is beautifully fine. It does not exceed $\frac{1}{1000}$th part of an inch in diameter. The edges—the fibre being viewed as a transparent object—was decidedly serrated; the serrations are regular and sharp,—in a direction from root to point,—18 of them were found in each division of the field, and consequently there were 2880 in the space of an inch, being 160 more than in the highly felting and valuable Saxon wool. There were, however, comparatively few curves.

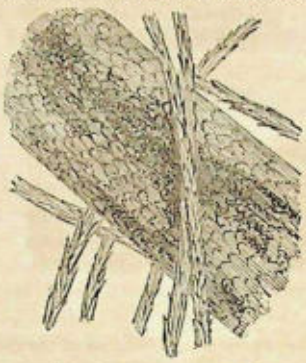
It was next viewed as an opaque object, and is depicted in the above cut —the cups answer in number to the serrations,—they extend horizontally across the fibre, and the upper edge is indented or crowned.

The hair varies in diameter from $\frac{1}{250}$th part to the $\frac{1}{500}$th part of an inch. The hair, as a transparent object, has a very clear outline, with some few faint cloudy irregularities on its surface, but without any serration—as an opaque object, it is covered with a scaly incrustation, but cannot be said to be serrated.

It is not for the author to pursue this inquiry to any greater extent, but when it has been determined on which of these substances the chief value of the skin depends, and by what circumstances the character and value of it is influenced or changed, it is easy to perceive what incalculable improvement may be introduced here by breeding and careful management, and how probable it is that this material may, in process of time, be devoted to purposes at present unthought of.

Another wool-bearing animal, a frequenter of the British coasts, is the seal. His coat is thus described in one of the most valuable of our works on Natural History :—"The hairs are all silken, flat, pointed, harsh, and

compact *." This is true of the external coat; but if this is turned aside, a variable quantity of wool is immediately discovered. No fewer than 748,785 of these skins were imported into Great Britain in 1831. In the specimen whence the hair and wool delineated in the annexed cut was taken —the yellow-spotted seal, often seen on the Dutch coast—the wool was abundant in quantity. The curves were not very thickly set, which induced the suspicion that serrations would not be numerous.



[*Seal's Hair and Wool.*]

It is viewed as an opaque object. The wool is exceedingly fine—not more than $\frac{1}{1250}$ th part of an inch in diameter—and if other things had corresponded, it would have been invaluable, but the serrations were few and far between; they did not exceed three in each of the divisions, or 480 in an inch: they were little more than a sixth part as numerous as in the Saxony fleece, and the serrations were not of a decided character; it was more an overlaying, or splicing of the parts, and a hooked formation. The hair, $\frac{1}{159}$th of an inch in diameter, about nine times as much as the wool, forms a singular contrast with the wool. It is beautifully covered with scales, but there is not the vestige of a serration.

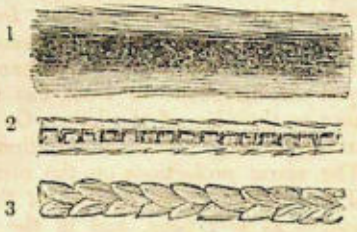
Two other cuts are given as illustrations of the previously unsuspected presence of wool in the coats of animals both wild and domesticated.

While the author was engaged in inquiries connected with this work, he observed a North American brown bear, in the gardens of the Zoological Society, changing a portion of his coat,—a matted substance was working its way through the hair, and became detached in large flakes. He secured one of these flakes, and found that it consisted chiefly of wool, in which a few hairs were involved. He wondered not at this, although no naturalist had spoken of the wool of the bear. It was the defence given by nature against the extreme cold to which this animal was necessarily exposed: it was evidently identified with the locality and the habits of the bear. It yet remains to be seen how far the skill and perseverance of the manufacturer will convert it, and that which is found on the back of many an animal that had not been dreamed of as a wool-bearer, to the purposes of man.

The author submitted it to the test of the microscope. It stood high in point of fineness. The diameter of the fibre was only the $\frac{1}{750}$th part of an inch,—the precise diameter of the Picklock Merino; but it had few curves, and few serrations,—four only in one of the divisions of the field, or 640 in an inch. These serrations had a curious character: they

* Griffith's Edit. of "Cuvier's Animal Kingdom," 8vo., vol. ii. p. 499.

resembled so many spires projecting at irregular distances, and at an exceedingly acute angle. The fibre here represented was viewed through lenses of a higher power, in order to bring out its peculiar structure.



[*Bear and Wolf-Dog's Wool.*]

1. The wool of the Bear. 2. Ditto, Wolf-Dog, transparent. 3. Ditto, opaque.

He did not, however, expect to find wool on the Italian wolf-dog. Although an inhabitant of the Alps, the individual from whose back he obtained the specimen had been domesticated in his native country, and, when afterwards removed to a more northern clime, had been sheltered from the vicissitudes of the weather. He, however, had a very considerable proportion of short wool beneath the hair. The curves, although few compared with those in the short-wooled sheep, were more than doubly as numerous as in the bear, and the serrations were increased in the same proportion. They amounted to nine in one of the divisions, or 1440 in an inch. Had the wool been long, it might have been said that it occupied an intermediate rank between the Leicester and the Lincoln, displaying somewhat fewer serrations than the former and more than the latter. The serrations were superficial and irregularly placed, some of them resembling small spines and others looking like rounded prominences. When viewed as an opaque object, the cup was composed of two and sometimes three leaves with rounded extremities.

The last illustrative cut that will be given represents the wool and hair of the tiger.



[*The Wool and Hair of the Tiger.*]

1. The hair of the tiger, opaque. 2. The wool of ditto, transparent.

The wool is beautifully fine; it is only the thousandth part of an inch in diameter. The serrations are likewise numerous, amounting to sixteen in each division, or 2560 in the space of an inch; they were small and somewhat confused; and, more to neutralize the felting principle, the number of curves are few.

The hair is covered with scales, resembling those on the back of a sole, and with no serration.

The fineness of the woolly fibre on these animals, compared with that which grows even on the Saxon sheep, is a circumstance deserving attention.

Now perhaps we should endeavour to set these points at rest, at least until further improvements in the microscope throw fresh light on the subject. Dr. Goring fancied he saw some toothed processes on the surface of the human hair. He has not figured this appearance; but the microscope, which developed the serrations of wool, has in some animals shown a similar appearance on the edge of the hair. On the hair of the seal and the tiger there are slight roughnesses, incrustations on the surface, but no serrated edge. The spiral projections on the surface of the bat's hair (fig. 1, p. 88), and the circular ones on that of the rabbit (fig. 3, p. 94), cannot be considered as serrations, and in the majority of the specimens of hair, the incrustations on the surface are too slight to give any decided serration to the edge.

The hair of the rabbit, the seal, and the tiger are illustrations of this: but, on the other hand, it will be seen that, in some neglected breeds of sheep, as the Wallachian and the Jamaica, there are decided, although slight, serrations.

The fibre of wool is crisped or curled, the curls increasing according to the fineness and felting property of the wool: hair is often disposed to curl, but in an inferior degree. The distinction, therefore, between these substances is more in degree than intent. *Wool is decidedly crisped and serrated; hair is sometimes curled, but to an inferior degree, and the irregularities of its edge, in some few cases, assume the form of slight serrations. Wool will felt; hair will only entangle and harle to a limited extent.*

This will, for every practical purpose, characterise these two substances, both of them referable to the influence of cultivation. The blood-horse has not a particle of wool about him—the neglected Shetlander is half covered with it. The fleece of the cultivated sheep has none of the hair that once deteriorated it, and is composed of wool. The uncultivated coat of all animals is composed of fur—*a mixture of wool and hair*—and either preponderating according to the localities and habits of the animals. The fur merchant, therefore, is right when, from the leopard to the sable, he applies the term fur to the covering which nature has given them: it is neither hair nor wool, but a mixture of both.

THE DIVISIONS OF WOOL.

The old and apparently simple division of wool was into LONG and SHORT, or, according to the purposes to which it was devoted, COMBING and CLOTHING WOOL; but there was considerable difficulty in arranging some fleeces which were of intermediate lengths, and convertible to either purpose. The almost incredible improvement in machinery within the last few years, and the change which had long been gradually taking place in certain wools, unobserved even by the owners of the sheep, and stoutly denied by them when it was first exposed to public attention, and also the revolution that has since been effected in the character of other wools, and the purposes to which they are devoted, have rendered this division totally inapplicable.

In the classification of wools, at least of such as are of British growth and are consumed in British manufactures, the author adopts the arrangement proposed by an intelligent correspondent at Bradford, whose name he regrets that he is not permitted to divulge, viz., LONG, MIDDLE, and SHORT.

LONG WOOL.

The most valuable of the long-woolled fleeces are of British origin. A

considerable quantity is produced in France and Belgium, but the manufacturers in those countries acknowledge the superiority of the British wool. It is to them what the foreign clothing wools have become to the English manufacturer. It is indispensable in many of their goods; and it is that by mixture with which, they are enabled to use the produce of their own country. In 1833, 1,424,208 lbs. of long wool were exported from England to France; and 3,275,448 lbs. to Belgium *. Long wool is distinguished, as its name would import, by the length of its staple. The average is about eight inches. It has much improved of late years both in England and in other countries. Its staple has, without detriment to its manufacturing qualities, become shorter; but it has also become finer, and truer, and sounder. The long-woolled sheep has been improved more than any other breed; and, since the close of Mr. Bakewell's valuable life, who may justly be considered as the father of the Leicesters, the principal error which he committed has been repaired, and the long wool has progressively risen in value, at least for combing purposes. Some of the breeds have staples of double the length that has been mentioned as the average one. Pasture and breeding are the principal agents here.

Probably, because the Leicester blood prevails in, or, at least, mingles with every other long-woolled breed, there has been rapidly increasing, a great similarity in the appearance and quality of this fleece in every district. The short-woolled fleeces are, to a very considerable degree, unlike in fineness, elasticity, and in felting property; the sheep themselves are still more unlike: but the long wools are losing their distinctive points—the Lincoln has not all of his former gaunt carcase, and coarse and entangled wool; the Romney Marsh has got rid of a little of the roughness of his form, and the length of his leg, while his wool, possibly a little thinner, has become truer and finer; the Teeswater has, in a manner, disappeared; the Cotswold and the Bampton have become varieties of the Leicester: in fact, all the long-woolled sheep, both in appearance and in fleece, are becoming of one family; and rarely, except from culpable neglect in the breeder, the fleece has not been injuriously weakened, or too much shortened, for the most valuable purposes to which it is devoted.

In addition to its length, this wool is characterized by its strength, its transparency, its comparative stoutness, and the little degree in which it possesses the felting quality.

Since the extension of the process of combing to wools of a shorter staple, the application of this wool to manufacturing purposes has undergone considerable change. In some respects the range of its use has been limited; but its demand has, on the whole, increased, and its value is more highly appreciated. There are certain and important branches of the woollen manufacture in which it can never be superseded, and connected with which it will be considered to be the staple produce of Great Britain.

> "If any wool, peculiar to our isle,
> Is given by nature, 'tis the comber's lock;
> The soft, the snow-white, and the long-grown flake †."

This long wool is classed under two divisions, distinguished both by the length and the fineness of the fibre. The first, the long combing wool, is used for the manufacture of hard yarn, and the worsted goods for which that thread is adapted, and requires the staple to be long, firm, and little disposed to felt. The short combing wool, has, as its name implies, a shorter staple, and is finer, and more felty. The felt is also closer, and softer, and is chiefly used for hosiery goods. The middle wools are now

* MacCulloch's Dictionary of Commerce, Art. "Wool."
† Dyer's Fleece, book ii.

usurping the place of the short-combing ones, and the short-combing approaches nearer to the quality and purposes of the long-combing wool.

MIDDLE WOOL.

The middle wool is almost a new article, but it is rapidly increasing in quantity and value. It will never supersede, but it will only stand next in estimation to the native British long fleece. It is yielded by the half-bred sheep, a race that will become more numerous every year, being a cross of the Leicester ram with the South-down, or the Norfolk, or some other short-woolled ewe; retaining the fattening property and the early maturity of the Leicester, or of both; and the wool deriving length and toughness of fibre from the one, and fineness and feltiness from the other.

Norfolk and Suffolk are taking the lead in the cultivation of this valuable breed; but the practice is establishing itself in every part of the kingdom, where the pasture and other circumstances will permit the introduction of such a breed. The average length of staple is about five inches. There is no description of the finer stuff-goods in which this wool is not most extensively and advantageously employed; and the noils (the portions which are broken off by, and left in the comb, whether belonging to this description of wool or to the long wool) are used in the manufacture of several species of cloth of no inferior quality or value.

Under the head of middle wools must now be placed those, that, when there were but two divisions, were known by the name of short wools; and, if we were treating of British productions alone, would still retain the same distinctive appellation. They are the South-down, Norfolk, Suffolk, Dorset, Ryland, and Cheviot wools; together with the fleece of several other breeds, not so numerous, nor occupying so great an extent of country. From the change, however, which has insensibly taken place in them all, —the lengthening, and the increased thickness of the fibre,—and more especially from the gradual introduction of other wools possessing delicacy of fibre, and pliability, and felting qualities, beyond what these could boast of, and, at the same time, being cheaper in the market than the old British wools ever were, or could be, these have gradually been losing ground in the manufacture of the finer cloths, and now cease to be used in the production of them. On the other hand, the change which has taken place in the construction of machinery has multiplied the purposes to which they may be devoted, and very considerably enhanced their value. It may be a little mortifying to the grower of the British short wool, to find that neither the superior, nor even the middle classes of society, will condescend to wear the cloths produced from his material; but human ingenuity has not only brought good out of evil, but has increased the advantages previously possessed, and has placed the interests of the grower and the manufacturer of wool on a basis which no changes in fashion or commerce can ever more materially affect.

A few years ago the grower of the British short-wools considered them as devoted to clothing purposes alone. He not only would have thought them disgraced, if the comb had been applied in the preparation of them for the loom; but, if pressed on that point, he would have confessed that they would not bear the action of the comb. Now they rank among the combing-wools: they are prepared as much, and in some places more, by the comb, than by the card. On this account they meet with a readier sale; and although, perhaps, they will never more obtain an extravagant price, yet, considering the increased weight of each individual fleece, and also the increased weight and earlier maturity of the carcase, they will, in proportion

to the value of other agricultural productions, and uninfluenced again by the changing character of the times, yield a fair remunerating price.

The qualities of these respective wools will be hereafter considered. The South-down sheep yield nearly seven-tenths of the pure short wool grown in the United Kingdom, the Dorsets, Rylands, Norfolks, &c., furnishing the remaining three-tenths: but these proportions vary in different districts, and, as has been already intimated, the half-bred sheep is, in some parts of the country rapidly, and in all of them gradually, encroaching on the pure short-woolled one—beautiful and valuable as the latter is.

The average staple of the British short-woolled, or rather, now, of this description of middle-woolled sheep, is 3½ inches.

Mr. Goodman, of Leeds, whose kindness the author particularly acknowledges, says, that "these wools are now employed in flannels, army and navy cloths, friezed coatings, Petershams, bear-skin and other coatings, heavy cloths for calico-printers and paper-manufacturers, woollen cords, coarse woollens, blankets, East India army cloths, and other woollen articles, many of them adapted to the trade of the United Kingdom, and largely exported to North and South America, the East and West Indies, Germany, and other places; besides, for the same purposes, being partially used in cassinets, baises, bockings, long ells, carpets, druggets, &c." Let the most enthusiastic admirer of the old short wools read this list, and say whether he has any reason to regret or to be ashamed of the change that has taken place.

SHORT WOOL.

From this division every wool of British production, save the Anglo-merino, may be considered as now excluded. It consists chiefly of a rapidly increasing importation from our colonies of New Holland and Van Diemen's Land, a smaller quantity from Russia, a decreasing one from Spain, and an amount very great, but now seeming to be stationary, from Germany. A Table to explain these importations will be found in the next page.

These wools are employed unmixed in the manufacture of the finest cloths, and combined with a small proportion of British wool, in others of some inferior value. The properties of the two kinds of wool will be slightly noticed when the history and present state of the manufacture of wool in Great Britain come under notice. The average length of staple is about two and a half inches.

Even these wools may now be submitted to the action of the comb. There may be fibres only one inch in length, but if there are others from two and a half to three inches, so that the average of the staple shall be two inches, then a thread sufficiently tenacious may, from the improved state of machinery, be spun, and many delicate and beautiful fabrics, unknown a few years ago, readily woven.

THE MANUFACTURING USES OF WOOL.

It is necessary to the completion of this chapter, that the principal uses of wool, long the most important manufacture of Great Britain, should be touched upon; and the more especially as an opportunity will thereby be afforded of briefly describing the respective processes of the woollen and worsted manufactures, and of pointing out more directly and clearly those peculiarities of conformation in wools of different breeds, which fit them for the one or the other purpose. The breeder cannot fail to derive some valuable hints from a careful consideration of the uses of wool; inasmuch

Account of Sheep and Lambs' Wool imported into Great Britain from Foreign Parts in the undermentioned Years, specifying the Countries whence it was brought, the Quantity brought from each, and the Rates of Duty, and the Produce of that Duty.

Countries from which Imported.	1810.	1820.	1825.	1830.	1832.	1833.	Rates of Duty.	Chargeable.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	Until 5th July 1803.	Free.
Russia, Sweden, and Norway	59,503	75,614	1,995,900	203,231	855,680	1,495,082	From 5th July 1803, to June 1804.	5s. 3d. per cwt.
Denmark	351,741	13,527	554,213	179,717	302,848	372,490	— 1st June 1804, to 5th April 1805.	5s. 10d.
Prussia	123,057	107,101	131,100	713,246	833,988	305,379		
Germany	778,835	5,113,442	28,799,661	26,073,882	19,832,225	25,370,106	— 5th April 1805, to 10th May 1806.	5s. 11d. 8-20ths
The Netherlands	2,873	186,051	1,059,243	939,123	209,144	811,031		
France	..	230,909	436,678	45,093	1,973	259,844	— 10th May 1806, to 5th July 1809.	6s. 4d. 2-20ths
Portugal	..	95,187	953,793	461,942	193,544	681,968		
Spain and Canaries	3,018,961	3,539,229	8,206,127	1,643,515	2,626,624	3,339,150	— 5th July 1809, to 15th April 1813.	6s. 8d. per cwt
Gibraltar	5,952,497	3,85.	19,256	..				
Italy	349,053	2,815	227,453	9,461	78,552	855,510		
Malta	21,554	5,050	72,131	..	564	4,803	— 15th April 1813, to 5th July 1819.	7s. 11d.
Ionian Islands	49,040	..	25,983	..	..	..		
Turkey	..	189,584	513,414	..	17,902	361,501	— 5th July 1819, to Oct. 1819..	1d. per lb.
Morocco	..	..	..	..	14,465	105,689		
Guernsey, Jersey, Alderney, & Man	41,467	19,015	22,266	7,745	13,516	30,374		
East Indies	701	8,056	..	..	..	..	Of British Possessions.	Of Foreign Countries.
New Holland & Van Diemen's Land	167	99,415	323,935	1,967,303	2,377,037	3,516,869		
Cape of Good Hope	29,717	13,869	27,619	33,407	83,257	93,325	From 10th Oct. 1819, to 5th Jan. 1823, 1d. per lb.	6d. per lb.
British N.A. colonies, W.I., & U.S. of America	4,111	1,477	80,538	9,038	628,915	335,649	— 5th Jan. 1823, to 10th Sept. 1824, 3d.	6d. ..
Mexico	..	..	..	..	3,139	..	— 10th Sept. 1824, to 10th Dec. 1824, 1d.	3d. ..
Peru	..	..	14,313	5,741	23,191	14,640		
Chili	..	14,792	2	..	..	..	— 10th Dec. 1824, to 5th July 1825, 1d.	1d. ..
Rio de la Plata and Brazil	116,173	73,036	331,302	20,539	15,456	2,619		
Prize	23,837	..	..	..	..	..	— 5th July 1825, free.	
Total Import from foreign parts	10,914,137	9,789,020	43,795,281	32,319,039	24,142,489	38,076,413		¼d. per lb. on wool not of the value of 1s. per lb.
Quantities retained for Home Consumption	..	7,691,773	41,101,636	31,522,839	27,666,350	39,066,620		1d. per lb. on wool of the value of 1s. per lb. and upwards.
Amount of Duty received	£ s. d. 32,580 4 3	£ s. d. 181,810 19 6	£ s. d. 163,799 16 7½	£ s. d. 120,420 8 0	£ s. d. 102,031 2 3	£ s. d. 137,855 1 8		

[From MacCulloch's "Dictionary of Commerce."]

as a more definite and precise aim will be given to his attempts at alteration or improvement in any particular breed on which he may be experimenting.

For the sake of brevity, the two grand divisions of the woollen trade—the manufacture of cloth and the manufacture of stuffs—will alone be explained: the manufacture of hosiery goods being dismissed with this observation — that the wools best adapted to it should possess the properties which discriminate combing-wools, combined with softness. The shorter and finer combing-wools are, in fact, the best wools for the hosiery trade.

THE MANUFACTURE OF CLOTH.

In this manufacture, the wool, being first dyed, (unless destined for black or such colours as either would not endure the after-process of milling and finishing, if dyed in the wool—in which case the cloth is made and partly finished ere it is dyed,) is subjected to the operation, of the scribbling and carding-machines. In order to understand these operations, the intention of which is to break down the fibres of the wool, to arrange them in an even mass or flake of a fibry texture, and to clear away all small particles of foreign matter, such as the substance of the dye-woods, &c., it is necessary to describe the machines.

THE SCRIBBLER.

The scribbler consists of a number of large wooden cylinders, placed horizontally on a frame, and almost touching each other, with smaller cylinders placed above them, and also nearly touching. To these cylinders a rotatory motion is communicated by straps, which receive their impulse from the power—be it of steam or of water—by which the mill is wrought. The reader has now to imagine that these cylinders are covered with iron teeth, very minute and closely set, and slightly bent; and that these teeth, as the cylinders revolve in opposite directions and in very near contact, work against or within each other. It will be obvious that, if any substance of a fibrous nature like wool is placed between them, it will be torn, and separated into minute portions. Now this is just what is done by the scribbler. The wool is placed on a cloth (receiving its motion from the same source as the cylinders) which delivers it between two rollers, and then to the first large cylinder, the fine iron teeth of which catch it up as they rapidly pass the opening of the rollers.

By a peculiar and ingenious contrivance, the wool is transferred from one cylinder to another, until it is thrown off from the last in a flake of the most gauze-like texture—the wool adhering by means of its hooked or curved formation. In this state it is taken to the carder.

THE CARDER.

This is a machine precisely similar to the scribbler in principle, but with numerous cylinders, and with wires or teeth of a finer texture. On this machine the business of breaking down the fibre, which varies greatly according to the fineness of the wool and the purpose for which it is destined, is still further carried on; but the wool, instead of being thrown off, as on the scribbler, in a thin flake, is formed into small rolls or cardings, as they are technically called, of about 30 inches in length. These are placed by young children on the Billy to be slubbed, the lengths being slightly joined by a dexterous movement of the hand.

To the slubbing, which is, in fact, a rough or preparatory spinning, suc-

ceeds the spinning—properly so called—and the thread is formed and ready for weaving.

FULLING.

Let us imagine this process complete, and the cloth delivered by the weaver into the hands of the miller or fuller. It is first cleaned from the oil and other impurities attaching to it from the processes it has previously undergone; and then being placed in the fulling-stock, and liquid soap being thinly laid upon it, the process of felting, already described, commences, and is carried on until either the piece will felt no longer, or is as close and stout as the manufacturer requires.

FINISHING.

When milled it is subjected to the action of the teazle, which draws the nap upon the surface; and that being cut down by the shears or knife, as close as the taste or the judgment of the finisher may think needful, form the short and silky pile, which is so much admired in woollen cloths.

It will be obvious, on a moment's consideration, that the closeness and richness of the pile or nap must depend on the fineness of the wool, and on the minuteness of the portions or fragments into which it will admit of being reduced on the carder and scribbler: the operation of the teazle being to draw out from the thread, and arrange in one direction on the surface, the ends of the broken fibres.

It will further be obvious, that in order to bear the action of the teazle without loosening the texture of the cloth too much, the wool should possess in a high degree the felting property; in other words, that it should possess numerous curves, causing the broken portions of the fibres to adhere by their mutual entanglement, and numerous and deep serrations on its surface,—the one multiplying the points of contact, and the other causing the adhesion of the fibres, when brought into contact, to be firm and tenacious. The degree, indeed, in which these two properties are possessed, discriminates the comparative value of clothing wools; other qualities, such as softness, fineness, &c., being equal.

On these properties the perfection of each process depends. The scribbling would dissipate the fibres, if they were deficient in the curved or hooked formation, and the thread could not be drawn out to a sufficient degree of fineness,—and if the serrations were few and superficial, the process of felting would leave the cloth loose in hand, and presenting on the surface, not that compact, close, and leathery appearance, which is so much sought after by the manufacturer, but a rough and shaggy nap, almost as opposite to the former as the rough pelt of the Shetland Galloway to the sleek skin of the race horse.

The process of the worsted manufacture shall now be described as briefly as possible, and some plain and palpable conclusions drawn from what has been stated.

THE WORSTED MANUFACTURE.—COMBING.

The wool having been scoured and oiled, *the comb* is employed. It consists of a handle, with a transverse piece of wood attached to it, in the form of a rude T (⊤). Three rows of long sharp steel teeth are placed in the transverse piece. On these the wool is hung until the comb is filled or loaded; and the ends of the wool are either tied or hung over the transverse piece, in order to be securely attached to it. The workman, holding this comb on his knee, takes another that has been heated in a

comb-pot which stands by him containing ignited charcoal, and draws it through these locks of wool. It is the common combing of the head, and precisely for the same purpose, in order to separate and smooth the hair, and remove the portions that are entangled and knotted. It often requires the exertion of considerable strength to force the comb through the wool, and there would be hazard of breaking a great number of the fibres. In order to prevent this, the wool is previously oiled, to facilitate the passage of the comb, and the comb is heated that the oil may be perfectly fluid.

When the workman has succeeded in arranging the fibres in a direction parallel to each other, and made what is called a *sliver*, which is a long, loose, flowing stripe or lock of wool, it is transferred to the drawing and spinning frames, which, by their operation, elongate or draw out the sliver, (a rough thread, like the roll, or carding, described under the last head,) until the yarn is sufficiently fine for the intended purpose; and the web being woven, cleaned, and dyed, is ready for use, without any felting or raising of the pile or nap on the surface. These two processes, in fact, could not be carried on very easily, and in some goods, hardly at all, on account of the length, and the peculiar arrangement of the fibres in the thread of worsted yarn; and in which it differs entirely from woollen yarn; but the threads of both are brought to the requisite fineness by a force causing the fibres to slide over each other in the direction of the length of the thread, which, at the same time, is twisted so as to bind the fibres together.

This drawing out of the thread, which all, who have seen the common operation of spinning hempen band, will easily understand, is regulated, in part, by the fineness of the wool, and, in part, by the purpose for which the yarn is intended. The ultimate limit to which the spinning can be carried, is, of course, determined by the former, as a certain number of fibres must cohere to give any tenacity to the thread *. Woollen and worsted yarns, however, differ, even when of equal fineness, in this important particular—the fibres in the former being placed in every possible direction, relatively to each other: those of the latter being all arranged in a parallel direction. It is evident that this formation of the latter originates with the combing, and is transmitted through all the subsequent stages of worsted spinning. The very different arrangement of the fibres in the woollen thread remains to be explained.

When the wool is wrought on the scribbler and carder, it is, of course, drawn very much in one direction of its fibres, but they are too short and minute for the finest cards to succeed in placing them in a strictly parallel direction; a fact quite evident from the circumstance of the wool adhering in a sort of light web, or loosely formed net-work, as it comes from the scribbler. On the carder, a certain portion of this filmy net-work is broken off by an ingenious contrivance, and rolled up into the carding on short threads. In this state the general direction of the fibres is across the thread, or in the line of its thickness. In the worsted thread, the

* The fineness to which the woollen thread has been spun almost exceeds belief. The following account is extracted from the Commercial and Agricultural Magazine for June, 1800.

A *hee* of woollen yarn measures in length 8 yards.

A *hank* of ditto, by the custom of Norwich, consists of seven hees.

Twenty-four hees in the pound, 13,440 yards, or about 7¾ miles, is esteemed good spinning in schools.

Seventy hanks in the pound, 39,200 yards, or about 22¼ miles, is esteemed superfine spinning at Norwich.

Three hundred hanks in the pound, 168,000 yards, or 95½ miles, have since been spun by Miss Ives, of Spalding, in Lincolnshire. This wool came from a sheep reared by Sir Joseph Banks. It was a cross breed by a Spanish ram out of one of the finest woolled Lincoln ewes.—Luccock on Wool, p. 154.

direction of the fibres is in the length of the thread, or just the very reverse of the former. In the process of spinning the latter, the points of the fibres are, in a great measure, covered; and the fibres themselves being long, and almost untouched, cause the thread to have a smooth, hard, and unbroken surface. The fibres, also, lying not merely parallel to each other, but in the same direction relatively to the position of the root and the point, there is no possibility, or a very slight one, of that hooking together,—that junction of the serrated edges,—on which, it has been shown, felting depends *.

Further, this formation of the fibre of worsted yarn opposes almost insurmountable obstacles to the action of the teazle, because the thread is compact; and if a nap is raised, the thread must be broken or torn up—a purpose for which it is obviously not formed.

Very different is the process of spinning woollen yarn. The fibres lying, as has been seen, across the thread, are, by the action of the spinning-frame, partially drawn into the direction of the length of the thread; and being very numerous from the breaking down of the carding-machine, present innumerable points on the surface of the thread,—the rudiments of the pile afterwards to be raised upon the cloth.

But this is not the only difference betwixt the two threads. The fibres of the woollen thread are commingled, so that the serrated edges come into contact,—it being obvious at once that, in the process of scribbling, the locks of wool are separated and broken up, and the individual fibres mixed and arranged in all possible directions. By this arrangement of the fibres in the thread of woollen yarn, two results are secured—the firm felting of the cloth, and the raising of a rich pile in the dressing of it.

The reader will now be prepared for another observation, viz., that the distinction betwixt woollen and worsted goods does not consist in any absolute difference or contrariety of nature in the wool of which the one or the other is made, but primarily in the mode of preparing the respective yarns; and secondarily, and consequent upon the peculiar formation of the thread, on the felting and raising of those fabrics only which are made of woollen yarn. True, worsted yarn must be made of wool of a certain staple or length; but, that difference apart, any wool may be made into woollen or worsted goods, indifferently, though the quality or excellence of the article will be greatly affected by the degree of suitableness or unsuitableness of the wools to the specific purpose to which they are applied. It needs no deep discrimination to discover the impropriety of breaking up on the scribbler, the long, rigid fibre of the Lincoln or Leicester wool for clothing purposes. It requires only a moment's glance at its formation

* Bakewell (of Wakefield) demonstrated the assertion here made—that the serrations must meet in order to the felting of wools, by a very simple and beautiful experiment. He took a lock of wool from the fleece, and tied it within a short distance of each end with silk, by which means the lock was divided into three portions; he then applied a minute quantity of soap, and worked the lock quickly betwixt his hands—in fact, he felted it by the compression of the hands—on precisely the same principle on which felting by the fulling or milling stock is effected. In a short time the two ends of the lock were formed each into a hard and solid button; the centre, betwixt the threads, was unfelted. He drew the conclusion, that wool will not felt unless the fibres are reversed relatively to each other, instead of lying, as on the sheep's back, in parallel lines—root to root, and point to point. The feathered or serrated edges could not meet or become entangled or locked together in the centre of the lock of wool, and therefore it did not felt—the ends being at liberty, the serrated edges met, and the felt was perfectly formed. Bakewell inferred the serrated or feathered formation from the experiment, and he reasoned rightly; we may now reason from the formation to the fact of felting, not more correctly, although a more strictly scientific, because more demonstrable, datum—Bakewell on Wool, p. 102.

(page 91) to perceive that it could not be formed into a thread at once soft, fine, and having numerous loose points or ends of fibres standing out on its surface: neither does it demand any great sagacity to discover the folly of diverting the close and deeply serrated fibre of Saxony wool to worsted stuffs, where any other wool of equal fineness, but deficient in the serrated edge, would be quite as valuable. The two fabrics, to be made in perfection, demand wools greatly differing in the degree of their curved and serrated formation; but the difference is one of degree only,—there is no opposition of structure, and each may be applied to either purpose, though with very opposite results,—in the comparative excellence of the manufactured article.

That the differences of adaptation to the one or the other great branch of the woollen trade was early discovered in wools of different families is perfectly evident from the fact of the very high antiquity of the comb*, and the more simple processes of felting, viz., by compression of the hands and of the feet. Hence a distinction originated of long and short,—or, combing and clothing wools; and hence, also, the confusion which must pervade any present arrangement of wools, whilst the very same kinds and qualities are used indiscriminately for both purposes. Hence, too, the necessity for that explanation of the different modes of spinning or forming the thread of woollen and worsted yarn respectively: upon which, in many fabrics, far more than on the peculiar length or formation of the fibre

* The invention of the comb and of the worsted manufactory is involved in great obscurity. From the simplicity of the preparation of the thread, it is not improbable that, although of somewhat later date than the art of felting, it was the first application of the loom to the manufacture of woollen goods. They who, in the time of the patriarchs, were skilled in the making of fine linen, would not fail of applying similar machinery to the conversion of the fibre of the fleece to kindred purposes. Ancient writers make no distinction between these essentially different preparations of different wools. Even when the spinning of worsted yarns, and the conversion of them into the peculiar kind of goods to which they were adapted, was established in the Netherlands, the writers of these days make no distinction between the different kinds of woollen articles. —*Luccock*, p. 63.

There is, however, no doubt that worsted goods were, like the other preparations of wool, first known in the East, and tradition has fixed on Armenia as the country whence they were transmitted to the regions of the West. Popular legends assign the invention of the comb to Bishop Blaise, who is said to have used it in Alderney. He lived, however, in Armenia, and suffered martyrdom under the tyrant Dioclesian. Dyer, in the second book of "The Fleece," has some pretty lines about him and his supposed discovery.

"Thus in elder time,
The rev'rend Blasius wore his leisure hours,
And slumbers broken oft; till fill'd at length
With inspiration, after various thought,
And trials manifold, his well-known voice
Gather'd the poor, and o'er Vulcanian stoves,
With tepid lees of oil and spiky comb,
Showed how the fleece might stretch to greater length,
And cast a glossier whiteness. Wheels went round;
Matrons and maids with songs relieved their toils;
And every loom received the softer yarn.
What poor, what widow, Blasius, did not bless
Thy teaching hand? thy bosom like the morn
Opening its wealth? What nation did not seek
Of thy new-modelled wool the curious webs?

What concern he really had in the improvement of the manufactory of wool it is impossible to say; but he was, like many of the Christian martyrs, cruelly tortured before he was put to death, and his flesh was torn from him with iron combs. The art of combing having been introduced into Europe by some merchants or travellers from Armenia, and every guild or fraternity of workmen having its tutelar saint, Bishop Blaise was selected as the patron of the wool-combers.—See *Luccock*, p. 38.

of the wool of which they are made, the distribution into the one or the other class of manufactures is founded. The merinos—a very beautiful fabric—manufactured of late years in enormous quantities at Bradford, are made of the best Saxon wool,—the very same as is extensively used in the neighbouring town of Leeds in the best woollen cloths: but in the manufacture of the former, the felting principle is not called into action; and is, indeed, partly forbidden by the arrangement of fibres, already described, as well as partially injured by the combing *; and in the latter, that principle is called into action, and expressly provided with the means of its fullest development, by the commingling and breaking of the fibres before the thread is formed.

It would, however, be erroneous to conclude that the distinction of combing and clothing wools is incorrect; on the contrary, wool which is soft, yielding, and, in proportion to its fineness, full of curves and deeply serrated, is adapted, by conformation, for the application of the fulling stock, and is misapplied when it is diverted to any other use. A wool, on the other hand, which is hard, unyielding, stout, or tenacious, and, in proportion to its fineness, deficient in curve and slightly serrated, is adapted to the comb, and can never be applied to the manufacture of cloth without serious disappointment. A clothing wool may be applied, with perfect propriety, to combing purposes, when of sufficient length and strength; but a combing wool is rarely, if ever, applied judiciously to clothing purposes.

The discovery of the serrated edge having now been happily made, an additional test of the fitness of wools for particular purposes is furnished to the manufacturer; whilst the breeder may learn to avoid a wrong or bad formation of the fibre, or to encourage a proper and good one. The former will either avoid mistakes in his appropriation of wool, or, better acquainted with the structure of the fibre, will discover new means of applying it to the fabrication of hitherto unknown articles of clothing. The latter will be able readily to discover the capabilities of particular breeds of sheep to produce wools of specific qualities of form and structure, and thus either reject or encourage, or modify, as prudence and judgment may suggest. Thus we may eventually arrive at a formation of the fibre of wool, in each of the two grand divisions of that valuable commodity, which shall combine all the qualities and excellencies demanded by the manufacturer,—each kind having all its own proper qualities, and being free from any one of those specifically belonging to, or only requisite in the other. The distinction, then, of clothing and combing wools will be accurate and scientific, because the appropriation of the wools will be restricted, necessarily and inevitably, to that branch of the manufacture, and to that only, under which they are respectively classed.

The change in the surface of the fibre, the obliteration of some of the serrations and the rounding of others, must necessarily lessen the felting property of the wool; the points of attachment will not be so numerous

* That the fibre of combed wools is partially injured in its felting property by that process is evident from the inspection of the cuts given in pp. 90 and 91. The serrated edge is partially destroyed. It is least apparent in the Saxon wool, p. 89; but in the South Down it cannot be mistaken when viewed either as a transparent or as an opaque object. In the transparent object the character of the serrations is altogether different; they scarcely project from many parts of the fibre, and some of them are nearly lost: in the opaque one the edges of the leaves that form the cups are smoothed or planed down. In the opaque fibre of the Leicester wool this is, if possible, yet clearer, and the sharp spines of the transparent fibre are changed into so many steps surrounding the column or pillar.

nor so firm, nor can the cloth be rendered so close and compact. The sliver, however, may on this account be better formed, the fibres may be brought closer to each other—they may assume more perfectly a parallel direction with each other—they may be more correctly arranged, and a finer, and at the same time a stronger yarn may be spun, and with less of that after-disposition to contract, which the manufacturer of worsted goods is so solicitous to prevent. The curves are diminished by nature in the wools devoted to the comb, and the comber diminishes and planes down the serrations; for, in the language of Luccock, "if these hairs contracted—and they are twisted in a spiral form, something like the threads of a compound screw—if these hairs contracted their length in any considerable degree, they could not be correctly arranged nor drawn out in that regular order which the work requires, but would be twisted into the thread in an irregular and crumbled form, a circumstance injurious to the yarn and to the goods which are made from it *."

Although the injury done to the felting property of wool, by the combing process, is undeniable, still it is not so material as to prevent even combed wool from being scribbled and felted. The noyles—those portions of combed wools which are retained in the comb, either because they are too short, or too much entangled, or too tender to pass into the sliver—are all used for the manufacture of cloth, and constitute a very important branch of the woolstapler's trade in all worsted districts. These wools felt well, but they have always what the clothiers call a wild or coarse *top*,—that is, they do not felt close on the surface of the cloth,—a circumstance which the character of the serrations and the injury done to them by combing readily accounts for.

Chapter IV.

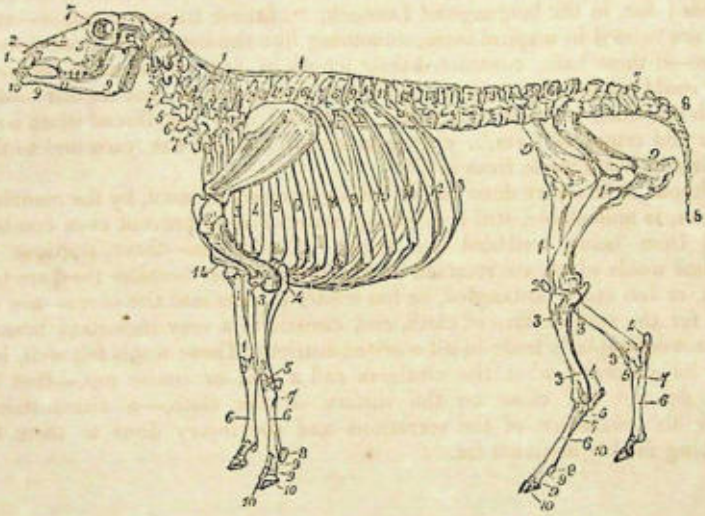
The History of the Foreign Breeds—Models—The Skeleton—The Leicester—South Down—Cheviot—The Fat-tailed Sheep—The African Sheep—The Egyptian—Ethiopian—Abyssinian—Madagascar—Cape—The Merinos at the Cape—The Angola Sheep—Guinea—Bearded—Barbary—Fezzan—Morocco—Tunis—The Tunis in America—The Asiatic Sheep—Persian—Thibet—East Indian—Ceylon—Javanese—Tartarian—The Argali—The Musmon—The American Sheep.

Before the history of the Sheep is commenced, and he is traced, so far as imperfect records will permit, through the different changes he seems to have undergone in different periods and countries, it will be advisable to give a sketch of him in his more perfect state, and as the gradual improvement of agriculture and of sheep-husbandry has made him. There would, however, be considerable difficulty attending this, if one kind of sheep alone was selected; for there is scarcely more difference between the hill and the vale country, than the practised eye perceives between the mountain and the lowland sheep. An outline of each of them must for the present suffice—the manner in which they have been bred up to their present state, and a

* One hundred and fifty hanks in the pound, 84,000 yards, or nearly 48 miles, were spun by Mary Pringle, of East Deriton, Norfolk; and this was thought so extraordinary that it was registered at the Royal Society.

lengthened account of the character and importance of the particular points of each, will be reserved for an after part of the work, when each breed will, in its turn, come under consideration. Enough will be given for the purpose of reference and comparison, as the early history of this animal proceeds.

The following skeleton is that of a Leicester sheep, but, perhaps, not of the best breed.



[*Skeleton of the Sheep.*]

The Head.

1. The inter-maxillary bone.
2. The nasal bones.
3. The upper jaw.
4. The union of the nasal and upper jaw bones.
5. The union of the malar and lachrymal bones.
6. The orbits of the eye.
7. The frontal bone.
9. The lower jaw.
10. The incisor teeth, or nippers.
11. The molars, or grinders.

The Trunk.

1. 1. The ligament of the neck, supporting the head.
1. 2. 3. 4. 5. 6. 7. The seven vertebræ, or bones of the neck.
1—13. The thirteen vertebræ, or bones of the back.
1—6. The six vertebræ of the loins.
7. The sacral bone.
8. The bones of the tail, varying in different breeds from 12 to 21.
9. The haunch and pelvis.
1—8. The eight true ribs with their cartilages.
9—13. The five false ribs, or those that are not attached to the breast-bone.
14. The breast-bone.

The Fore Leg.

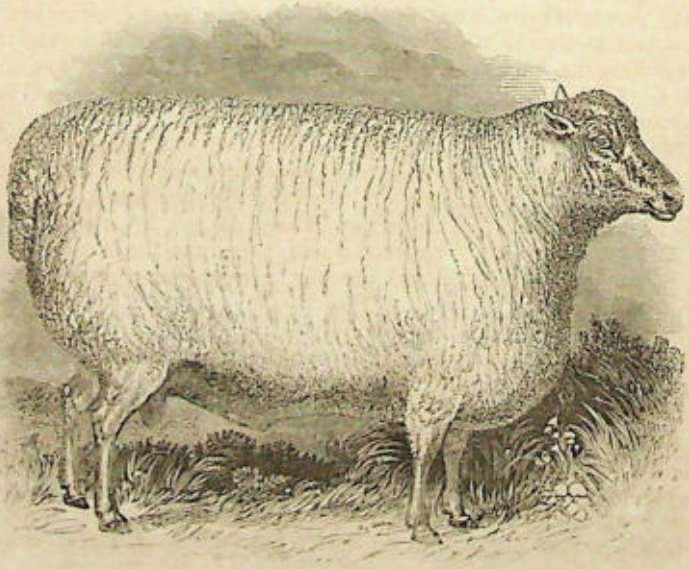
1. The scapula, or shoulder-blade.
2. The humerus, bone of the arm, or lower part of the shoulder.
3. The radius, or bone of the fore-arm.
4. The ulna, or elbow.
5. The knee with its different bones.
6. The metacarpal, or shank-bones—the larger bones of the leg.
7. A rudiment of the smaller metacarpal.
8. One of the sessamoid bones.
9. The two first bones of the foot—the pasterns.
10. The proper bones of the foot.

The Hind Leg.

1. The thigh-bone.
2. The stifle-joint and its bone—the patella.
3. The tibia, or bone of the upper part of the leg.
4. The point of the hock.
5. The other bones of the hock.
6. The metatarsal bone, or bone of the hind leg.
7. Rudiment of the small metatarsal.
8. A sessamoid bone.
9. The two first bones of the foot—the pasterns.
10. The proper bone of the foot.

As a lowland sheep, and destined to live on good pasture, the New Leicester is without a rival—in fact he has improved, if he has not given the principal value to, all the other long-woolled sheep.

The head should be hornless, long, small, tapering towards the muzzle, and projecting horizontally forwards. The eyes prominent, but with a quiet expression. The ears thin, rather long, and directed backwards. The neck full and broad at its base where it proceeds from the chest, but gradually tapering towards the head, and being particularly fine at the junction of the head and neck; the neck seeming to project straight from the chest, so that there is, with the slightest possible deviation, one continued horizontal line from the rump to the poll. The breast broad and full; the shoulders also broad and round, and no uneven or angular formation where the shoulders join either the neck or the back, particularly no rising of the withers, or hollow behind the situation of these bones. The arm fleshy through its whole extent, and even down to the knee. The bones of the legs small, standing wide apart, no looseness of skin about them, and comparatively bare of wool. The chest and barrel at once deep and round; the ribs forming a considerable arch from the spine, so as in some cases, and especially when the animal is in good condition, to make the apparent width of the chest even greater than the depth. The barrel ribbed well home, no irregularity of line on the back or the belly, but, on the sides, the carcass very gradually diminishing in width towards the rump. The quarters long and full, and, as with the fore-legs, the muscles extending down to the hock; the thighs also wide and full. The legs of a moderate length, the pelt also moderately thin, but soft and elastic, and covered with a good quantity of white wool, not so long as in some breeds, but considerably finer.



[*The New Leicester.*]

This account combines the main excellences both of Bakewell's own breed and Culley's variety or improvement of it. It is precisely the form for a

sheep provided with plenty of good food and without any great distance to travel or exertion to make in gathering it.

The principal recommendations of this breed are its beauty and its fulness of form, comprising, in the same apparent dimensions, greater weight than any other sheep; an early maturity, and a propensity to fatten equalled by no other breed; a diminution in the proportion of offal, and the return of most money for the quantity of food consumed *.

The sheep whose portrait is represented in the previous cut belonged to his Grace the Duke of Bedford.

The next is the hill sheep, adapted to more elevated situations and shorter feed on the natural and permanent pastures; able also to travel, without detriment, a considerable distance to the fold and to the down. There can be no hesitation in fixing on the South-Down as the model here.

The following is the substance of the description of this sheep by Mr. Ellman, who, if he may not be considered, like Mr. Bakewell with regard to the Leicesters, as founder of the breed, yet contributed more than any other man to its present improvement and value.

The head small and hornless; the face speckled or grey, and neither too long nor too short. The lips thin, and the space between the nose and the eyes narrow. The under jaw, or chap, fine and thin; the ears tolerably wide, and well covered with wool, and the forehead also, and the whole space between the ears well protected by it, as a defence against the fly.

The eye full and bright, but not prominent. The orbits of the eye—the eye-cap, or bone,—not too projecting, that it may not form a fatal obstacle in lambing.

The neck of a medium length, thin towards the head, but enlarging towards the shoulders where it should be broad and high, and straight in its whole course above and below. The breast should be wide, deep, and projecting forwards between the fore legs, indicating a good constitution, and a disposition to thrive. Corresponding with this, the shoulders should be on a level with the back, and not too wide above; they should bow outward from the top to the breast, indicating a springing rib beneath, and leaving room for it.

The ribs coming out horizontally from the spine, and extending far backward, and the last rib projecting more than the others; the back flat from the shoulders to the setting on of the tail; the loin broad and flat; the rump long and broad, and the tail set on high and nearly on a level with the spine. The hips wide; the space between them and the last rib on either side as narrow as possible, and the ribs, generally, presenting a circular form like a barrel.

The belly as straight as the back.

The legs neither too long nor too short. The fore-legs straight from the breast to the foot; not bending inward at the knee, and standing far apart both before and behind; the hocks having a direction rather outward, and the twist, or the meeting of the thighs behind, being particularly full; the bones fine, yet having no appearance of weakness, and of a speckled or dark colour.

The belly well defended with wool, and the wool coming down before and behind to the knee, and to the hock; the wool short, close, curled, and fine, and free from spiry projecting fibres.

The South-Down is adapted to almost any situation in the midland part of England; it has a patience of occasional short keep, and an endurance of hard stocking, equal to any other sheep; an early maturity, scarcely

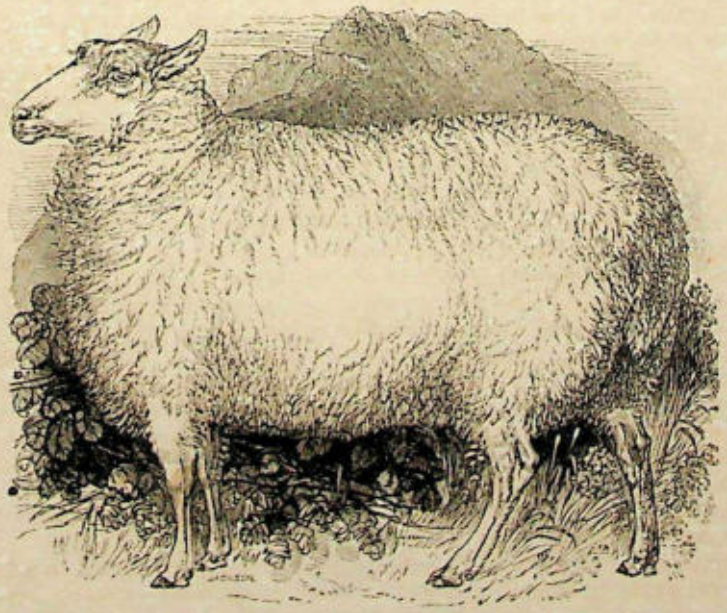
* Culley on Live Stock, and Marshall's Midland Counties.



[*The South-Down Ewe.*]

inferior to that of the Leicesters, and the flesh finely grained, and of peculiarly good flavour *.

The inhabitant of a still more elevated region and a colder clime, occa-



[*The Cheviot Sheep.*]

* Baxter's Agricultural Library, p. 453.

sionally exposed to the severest storms, yet enduring them and thriving, will complete the list of models; and among the British sheep, the Cheviot most deserves to be selected.

A description of them by a writer in the Farmer's Magazine, who had studied and known them well, is selected as a faithful representation of what they were, or what a good Cheviot should be, even before this breed had received the last improvement from the Leicesters:—

"The head polled, bare and clean, with jaw bone of a good length. Ears not too short. Countenance of not too dark a colour. (Repeated crossings with the Leicester have now made both the face and the legs white.) Neck full, round and not too long; well covered with wool, and without any beard or coarse wool beneath. Shoulders deep, full, and wide-set above. Chest full and open. Chine long, but not too long; straight, broad, and wide across the fillets. Hams round and plump. Body in general round and full, and not too deep or flat in the ribs or flanks. Legs clean, of a proportionable length, and well clad with wool to the knee-joints and hocks. Fleece fine, close, short, and thick set; of a medium length of pile, without hairs at the bottom, and not curled on the shoulders, and with as little coarse wool as possible on the hips, tail, and belly. A sheep possessing these properties in an eminent degree may be considered as the most perfect model of the Cheviot breed." *

These sheep, notwithstanding the strong prejudice that was entertained against them, have established themselves in every part of the South Highlands, almost to the exclusion of the native horned and *short* breed; and when their wool is become a little finer in the pile and somewhat shorter in the staple, in order to make it at the same time more portable by the animal and fitter for the cloth manufacturer; when the pelt is a little thicker, better to ensure, if need be, the hardihood of the breed, and the wool is a little more equal in point of quality on every part of the sheep, the Cheviot will extend itself also through the Northern Highlands, and there, too, the value of the sheep-farm and the comfort of the peasant will be more than doubled. The native black-faced breed—the *short* sheep—with which the Cheviot is still contending far in the north, and which he is gradually displacing, might, perhaps, deserve a place in the catalogue of models; but, valuable as he is, he must gradually give way, and in a manner disappear.

THE FAT-TAILED SHEEP.

Several breeds of sheep, that seem to be derived from a variety of the primitive race, are found in the countries which the patriarchs traversed. In Syria, the chief residence of the early shepherds, a sheep is cultivated, of which Dr. Russell, in his History of Aleppo, gives the following account: "The dead weight of one of these sheep will amount to 50lbs. or 60lbs. of which the tail makes up 15lbs. or 16lbs.; but some of the largest that have been fattened with care weigh 150lbs., the tail alone composing one-third of the whole weight. This broad, flattish tail is mostly covered with long wool, and, becoming very small at the extremity, turns up. It is entirely composed of a substance between marrow and fat, serving very often in the kitchen instead of butter, and cut into small pieces, makes an ingredient in various dishes. When the animal is young, it is little inferior to marrow."

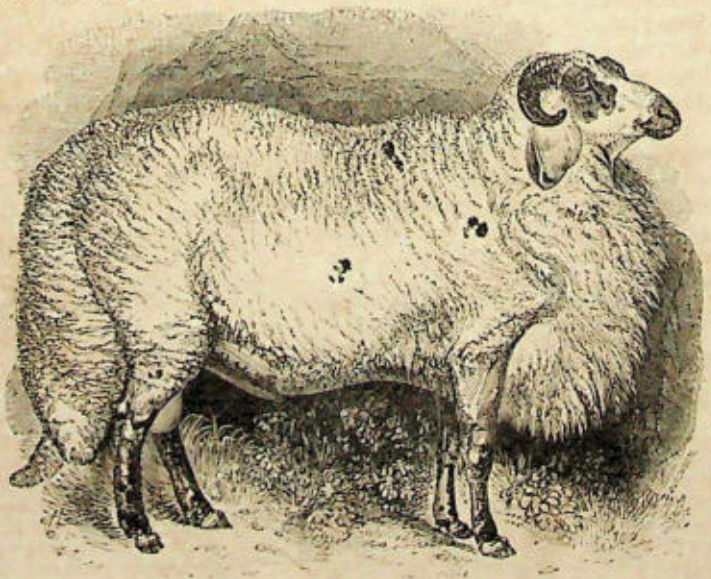
This race of sheep is found scattered over almost as large an extent of country as the fat rumps. They differ in the comparative accumulation of fat, compared with the general weight of the animal, and in the situation of the fat. In some, as in the sheep of Syria, it accumulates about the

* Farmer's Mag. 1810, p. 143.

upper part of the tail, and may very readily be considered as a variety of the *Steatopyga* already described. This strange collection of adipose matter has only shifted its situation a very little way, viz., from the posterior part of the haunch—the very rump—to the superior part of the tail. This variety might have been at first accidental, and perpetuated either by accident or design. Others have two large lobes of fat at the sides of the tail, reaching as low as the hocks. This is an extension of the first deviation. In a third variety, the masses of fat not only extend to, but chiefly occupy, the inferior part of the tail, which is naked and almost flesh-coloured. This further deviation presents nothing more remarkable than is found in other breeds. Sheep of one or the other of these varieties extend over Syria, Egypt, Southern Africa, Russia, India, and China *.

Dr. Russell thus continues his account of the Syrian sheep :—" Animals of this extraordinary size (150lbs.) are, however, very rare, and kept up in yards, so as to be in little danger of hurting their tails as they walk about: but in the fields, in order to prevent injury from the bushes, the shepherds in several places of Syria fix a thin piece of board to the under part, which is not, like the rest, covered with wool, and to this board are sometimes added small wheels; whence, with a little exaggeration, we have the story of the oriental sheep being under the necessity of having carts to carry their tails. But the necessity of carriages for the tails of the African sheep, mentioned by Herodotus, Rudolphus, and others, is real. The tail of that animal when fat actually trails, not being tucked up like those of the Syrian sheep."

The following cut contains the delineation of a rather unusual variety of the fat-tailed sheep that formed part of the collection in the Jardin des Plantes in Paris. The profusion of long wool and hair, extending from the lower part of the neck to the brisket, gives it a singular, and not unpleasant, appearance.



[*The Fat-tailed Sheep.*]

The Animal Kingdom, vol. iv. p. 328.

Dr. Anderson, from Pallas, gives a more satisfactory account of the form and qualities of this sheep, as found among the Boucharian Tartars. He says that "it is seldom larger than the common Russian sheep: the head is like that of the fat-rumped, but the muzzle sharper, the body rather smaller than that of the fat-rumped; the ears large and pendent. They have a small collection of fat on the rump (a further corroboration of their being merely varieties of the steatopyga), a tail fat and broad at the base, with a long narrow appendage; and the wool compact and thick, soft and elastic, (so far, he of course means, as elasticity is compatible with softness—the elasticity of the fine-woolled Saxony fleece, each fibre of which, when cut into shreds, obstinately retains its native curls; accordingly he adds) regularly formed into frizzled circles *."

In the lamb (see p. 53) it appears like little delicate circular waves, which seem as if they were pressed close to the skin by art, and elegantly marbled, with feathered waves like silk damask.

Dr. Anderson well observes here that there cannot be a clearer proof of the pureness and trueness of the wool; for if any hairs mingle with it, they are always observed at the birth of the lamb: they are then more fully grown than the wool, and often give to the fleece an unsightly, shaggy appearance †. He adds, that a fleece of this character might be rendered exceedingly valuable under proper management; but that from a Tartar tribe it would be fruitless to look for improvement which must be purchased at the expense of patience and labour; and especially when, in their estimation, so ample a remuneration can be obtained by the slaughter of the lamb.

THE EGYPTIAN, ETHIOPIAN, AND ABYSSINIAN SHEEP.

Travellers give a very unsatisfactory account of the sheep near the eastern coast of Africa, and on the borders of the Red Sea. The fat-tailed sheep prevail in Egypt, and both varieties of them are found; but those with long tails, nearly or quite reaching to the ground, are more numerous than the broad-tailed kind. They are of large size, mostly with black heads and necks, an external coat of hair, and their flesh well-flavoured ‡.

In Nether Ethiopia the sheep begin to be more numerous; they are large—some of them with tails from 18lbs. to 25lbs. in weight—with black heads and necks, and the remainder of their bodies white; others are quite white, with tails reaching nearly to the ground, and becoming curved at the extremity §. Here also the fat-rumped variety again begins to be found—smaller—more compact than those with long tails—with black heads and necks, and bearing resemblance to, but being of rather smaller size than the Persian sheep||.

Proceeding farther southward, they are, according to Bruce, taller and all black; their heads large, and with ears remarkably short and small. They

* Anderson on Sheep, p. 53.

† Speaking of the possibility of obtaining any of the Boucharian sheep for the purpose of experimental breeding, Dr. Anderson observes that it would be attended with almost insuperable difficulty. The southern provinces of Siberia, which border on the Kirguise country, where the best fat-rumped Russian sheep are found, are at least 2000 miles from Petersburgh, and the cattle which are sent from Siberia to the capital of Russia occupy about two years in completing their journey, passing through the hands of several different merchants by the way: it is therefore probable that a great proportion of them would die or be lost on the journey. Boucharia is at least 1000 miles beyond the Kirguise country, in the same route. The first destination of the Boucharian sheep and skins is the Siberian market; their after route is a hazardous speculation.—Anderson, p. 154.

‡ Anderson, p. 55. § Dapper's Africa, p. 86.

|| Ogilby's Africa, 1670. Pp 232 and 538.

also, like all the native sheep within the tropics, have an external covering of hair: but that hair is sometimes remarkable for its lustre and softness. The tail is neither large nor fat, and the mutton is remarkable for its pleasant flavour*. The smaller sheep, resembling, and, except in size, identical with, the Persian or primitive breed, is more prevalent. The cut given in p. 23, faithfully represents the usual Abyssinian sheep, but of a somewhat larger size. Here, too, pursuing this route through the African peninsula, we begin to find the many-horned sheep. When the usual number of horns is exceeded, most of the animals have four: travellers, however, mention one variety that has six—but the existence of these does not rest on unquestionable authority†.

There are few countries in which the rot is, at certain seasons of the year, more prevalent and destructive than on the banks of the Nile, from the Delta to Abyssinia, and yet there is no country in which it seems to be so much under control. As soon as the Nile returns to its bed, the Egyptians and the Bedouin Arabs drive their sheep to feed on the luxuriant pasturage which seems to spring up as it were by magic: but the soil is yet replete with moisture, and exposed, in Ethiopia and Abyssinia at least, to a tropical sun; and those deleterious miasmata are developed, which are now generally acknowledged to be the sole cause of the disease.

The sheep fatten on this new and succulent herbage with a rapidity almost incredible; but the poison soon begins to display its baneful influence. The Bedouins are watchful for the first indication of the rot, and they lose not a moment. They collect their flocks and drive them back to the deserts; and there, in the midst of the sands, and their principal food being of a dry and stimulating nature, the symptoms of the malady gradually disappear, and the sheep regain their former health. The Bedouins know not any other curative treatment—they want no other; or, if deluded by the rapidly increasing condition of the sheep, they loiter a little too long in the neighbourhood of the river, and this simple mode of treatment fails, they destroy the animal before he has wasted too much. When, however, the rot appears in that portion of the Nile, in Lower and in part of Upper Egypt, where despotism has established her throne, the inhabitants are indifferent to the progress of the pest. They know well the cause of it; but they attempt not to combat it. Their sheep and their wool belong not to them, and why should they occupy themselves with the amelioration of their flock, or endeavour to preserve them in health ‡?

At Cape Guarda, a little way south of the Straits of Babelmandel, the sheep are white, with rather small black heads. They are a large, handsome breed, resembling the Abyssinian and the Persian, except that they have broad, fat tails, six or eight inches in length §.

THE MADAGASCAR SHEEP.

The eastern coast must now be pursued almost to the Cape of Good Hope before we can gather from travellers any authentic account of the character and value of the sheep. In the 13th degree of south latitude, however, the northern promontory of Madagascar presents itself, at no great distance from the African coast. The sheep resemble those on the opposite continent: they have large, broad tails ||, and nothing more would be said of them, had not Dr. Anderson ¶ given a long description of one of them,

* Bruce's Travels, vol. iv. p. 277. † Dapper's Africa, p. 17.
‡ The Veterinarian, vol. iii. pp. 538, 590. § Anderson on Sheep, p. 59.
|| Travels in Europe, Asia, and Africa, 1781. Vol. ii. p. 399.
¶ American Phil. Trans., vol. iv. p. 141.

and drawn some important, yet not altogether correct conclusions from his examination of the animal. He says, "A Danish East Indiaman put into Leith roads on her return home. I went on board to see what curiosities she had, and I there found a very fine sheep, which was closely covered with a close coat of thick, short hair, very smooth and sleek, like the coat of a well-dressed horse, but the hairs rather stiffer, and thicker set on the skin, and the colour a fine nut brown. This sheep, I was told, was brought from the island of Madagascar, and that all the sheep found on the island were of the same sort. Along with it was another sheep, brought from India, carrying a very close fleece of good wool, which," as he very properly remarks, and it is a principle that should never be forgotten by the sheep owner, "clearly proves the influence of breed in overruling that of climate."

Dr. Anderson had not examined the coat of this animal so closely as he might have done, and therefore, overlooking the wool (sometimes short, and small in quantity), which may always be found beneath its hairy coat, and which, at the period of moulting, is evidently separating from the pelt, and working its way through the hair, he draws the erroneous conclusion that "the sheep is not necessarily a wool-bearing animal, and that there are those that carry short, stiff hair only, and nothing that resembles wool, or that can be employed in manufactures for the same uses as wool; and others that carry long hair, that has been generally confounded with wool, and that may be shorn and employed in coarse fabrics in the place of wool." This cannot possibly be maintained. The sheep is essentially a wool-bearing animal. Nature has superadded another coat where the climate or other circumstances seemed to demand it; but man, by pursuing a judicious system of breeding, is able, in defiance of climate, not only to lessen, but completely to remove the hair.

THE CAPE SHEEP.

The desert and almost unknown coasts of Adal and Ajan, and Maracatos, having been passed, the marshy district of Zanquebar, with its abundance of elephants, presents itself, with its city of Melinda, inhabited principally by Mahometans, but nominally dependent on the Portuguese. To this follows the Portuguese kingdom of Mozambique, and other various uncivilized tribes; and it is not until we reach the Dutch settlements north of the Cape that any authentic account of the sheep can be found.

The native Cape sheep are of the broad-tailed breed. Barrow gives one of the best descriptions of them *. He says that "they are long-legged, small in the body, and thin in the fore quarter and across the ribs. They have little internal or external fat, but it is all collected on the rump and on the tail †, proving them to be either a variety of the steatopyga, or a mixture of them and the broad-tailed sheep. The tail is short, broad, flat, naked on the under-side, and weighing from six to twelve pounds. The fat is of a semi-fluid nature, or rather having the consistence of a thick oil, and is frequently used as a substitute for it and for butter ‡."

* Barrow's Southern Africa, vol. i. p. 116.

† A writer of considerable talent, but evidently under the influence of much prejudice, says, that "they are wretched beasts; the other parts of the body seem drained to supply the accumulation of fat on the tail. They are lanky, sinewy beasts, more shaped for racing than roasting, and without an ounce of fat to encumber their speed."—Farmer's Magazine, Aug., 1821.

‡ From this description of Barrow, and whose fidelity cannot be doubted, it would not have been expected that the Cape sheep would have been very profitable feeders; yet another traveller writes, "It was not without much astonishment that we beheld the considerable number and unparalleled fatness of the sheep here, compared with the horrid drought and aridity of the land. In this part of the country they always look out for the

They are of every variety of colour—black, brown, bay, but mostly spotted; their necks are small, their ears long and pendulous; they weigh from 60 to 70 lbs. on their inland pasture, but when brought to the barren country about the Cape, they often dwindle down to 40. They are covered with strong frizzled hair, of which little use is made, except for cushions and mattresses. The sheep are neither washed nor shorn, but the wool is suffered to drop off of its own accord, which it does in September and October. The skins clothe the Hottentots and the children, or make bags for various household purposes."

These observations of Barrow refer to the native sheep alone, whether the property of the Hottentots, or of the European settlers, English or Dutch. Burchell gives a fuller history of the purposes to which the skin of the Cape sheep is devoted. "When these skins are properly dressed and cleaned, and a number of them sewed together, they form a much warmer covering than could be made from any other materials. The richer inhabitants, and those of Cape Town who can afford themselves more expensive coverings, affect to dislike the cheaper *koombaar* (the name given to these garments), because, they say, it smells of mutton; but the boor (the Cape farmer) is enabled, by his immense flocks, to select such only as have a smooth fur, and so he obtains a handsome coverlet, so unlike what a European could imagine for sheep's-skins, that it may be doubted whether many persons would even guess from what animal it was made. Those that have been brought to Europe have been viewed as the skins of some unknown quadruped. Few furs can be more beautiful than the selected skins of lambs thus prepared *."

When the Dutch began to settle in the neighbourhood of the Cape in 1650, the Caffers, notwithstanding their wild and savage life, were, to a considerable extent, shepherds. The country abounded with cattle, and more especially with sheep. The employment and the wealth of the boors, until they devoted themselves to the cultivation of the vine, consisted in the rearing and pasturage of oxen and sheep. Burchell sketches the following evening scene:—"It was an amusing and interesting sight to behold, a little before sunset, the numerous flocks streaming like an inundation over the ridges and low hills, or moving in a compact body like an army invading the country, and driven forwards only by two or three Hottentots, with a few dogs. At a great distance the confused sound of their bleating began to be heard; but as they approached nearer and nearer, the noise gradually increased till the various cries of the multitude mingled with the whole air, and deadened every other sound. The shepherds seldom returned home

leanest in the flock; the tail alone of one of these sheep (which is thick, and of a triangular shape, being from a foot to a foot and a half in length, and sometimes above five or six inches thick near the rump) will weigh from 8 to 12 pounds, and mostly consists of a delicate kind of fat, which is eaten with bread instead of butter, and is used for dressing victuals."—Sharrman's Voyage to the Cape of Good Hope, vol. i. p. 300.

It is to be hoped, for the sake of humanity, that the Hottentot method of butchering the sheep is not now in use. "They tie his fore-legs together and then the hind-legs, and then stretch him on his back, and rip up his belly, so that the entrails appear; then with one hand they gently tear them from the carcase, and with the other hand stir the blood that flows into the belly, in order to keep it from congealing. While the butcher is doing this, he avoids as much as possible the breaking of any of the large blood-vessels, by which means the animal is at least a quarter of an hour dying. Having torn away the intestines, another hastily cleans them, and lays a part of them on the fire to broil; and such dispatch is made, that this is generally devoured before the sheep is dead. The blood is then scooped out of the carcase with sea-shells, and put in pots, mixed with the remainder of the intestines, minced very small, and that forthwith is set a stewing. When the sheep is quite dead, he is skinned and eaten up."—Kolben's Cape of Good Hope, p. 226.

* Burchell's Travels in Africa, vol. ii. p. 175.

without bringing under their arms a lamb or two which had been dropped in the course of the day, and as yet too weak to follow their dam. The faculty which the Hottentots possess of distinguishing the features, as it were, and characteristic appearance of each sheep, is almost incredible, and they seldom mistake the ewe to which each lambkin belongs*."

Dreadful was the system of oppression pursued by the European invaders. The native inhabitants were all massacred or enslaved, or driven into the interior, whence they often returned to annoy and avenge themselves on their tyrants. It had been hoped that, when the colony at the Cape was permanently ceded to the British, the condition of the original possessors of the country, debased and strangely changed in form and in mind, would have been ameliorated; and so it doubtless would and will be, but the sense of oppression and injury rankled in the minds of the Bushmen, and, instigated by some runaway slaves, and infuriated by some, perhaps too severe, acts of legal justice, they have turned on their masters; and although the eventual security of the colony is not, perhaps, endangered, more than 80,000 head of cattle, and sheep almost innumerable, have lately (1834) been driven away or destroyed by the natives.

When the value of the Merino wool began to be acknowledged, a few of the Spanish sheep were sent to the Dutch colonies at the Cape of Good Hope; but the native sheep seemed, from the nature of its covering, to be so plainly adapted to the situation in which it was placed; and the prejudice was so strong, and so universal, that it would be useless to attempt to preserve the fineness of the Merino wool in the torrid clime of Southern Africa; and, perhaps the prevailing motive, the use of the fat obtained from the tail of the Cape sheep, was so various, and so identified with the likings and habits of the colonists, that few of the Dutch farmers could be induced to give the new-comers even the shadow of a trial. The experiments that were made were confined chiefly to the Government farms, and a few others in their immediate vicinity. It is needless to say that they were, to a great degree, unsuccessful.

When these colonies were ceded to Britain, a more extensive and a fairer trial was given to the Merino sheep at the Cape; and even then, though neither pains nor expense were spared, the success was at first far from being encouraging. Owing to bad management of various kinds, the wool actually seemed to have degenerated, and it was so much clogged with sand and small vegetable substances, as greatly to deteriorate its value in manufacture. A very intelligent traveller, and a colonist at the Cape, Mr. Thompson,

* Burchell's Travels, vol. i. p. 242. "I saw," says Sharrman, "an old Boshies-man and his wife, who, I was informed by a farmer, had, a few months before, reigned over a tribe of Boshiesmen. They were now translated from their former royal or patriarchal dignity to the station of shepherds over a few hundreds of sheep. On the whole, he gave them great commendation, as being exact in their business, and suiting their inclination to their fortunes, yet he indignantly reprobated that system of spoliation and oppression which could scatter a whole community, and degrade and enslave its sovereign."—Sharrman's Voyage, vol. i. p. 300.

Pringle had some such scene in his mind's eye, when he thus describes the Hottentot:

"Mild, melancholy, and sedate he stands,
Tending another's flocks upon the fields—
His father's once—where now the white man builds
His home, and issues forth his proud commands.
His dark eye flashes not;
——————he yields
Submissively his freedom and his lands.
Has he no courage? Once he had—but lo!
The felon's chain hath worn him to the bone.
No enterprise? Alas, the brand, the blow
Have humbled him to dust."—African Sketches.

confirms this statement. "This I am fully aware of, having sent home some wool esteemed of good quality, which lost above half its weight in washing, and produced a cloth about 12s. per yard in value, which I sold at the Cape, and the result paid me little more than 5 per cent. on the capital *."

The difficulties which at first opposed the establishment of the Merino sheep have now been conquered, and wool of excellent quality from almost every part of the colony, and particularly from the eastern districts, has been sent to England. Some British sheep have also been tried, particularly the South Downs; but there, as in their native clime, these have yielded to the Merino, so far as the manufacture of fine cloth was concerned. In 1804, there were in the colony 536,634 sheep. In 1811, there were 1,293,740, being an increase of 757,106 in seven years†. In 1810, 29,717 lbs. of wool were imported into Great Britain from the Cape of Good Hope. In 1833, the importation had increased to 93,325 lbs‡.

As to the actual state of the fleece, M. Lasteyrie, the unwearied advocate of the Merinos, uses this remarkable language, and which should never be forgotten by the breeder of every kind of sheep and everywhere :—'The preservation of the Merino race in its utmost purity at the Cape of Good Hope, in the marshes of Holland, and under the rigorous climate of Sweden, furnish an additional support of this, my unalterable principle, *fine-wooled sheep may be kept wherever industrious men and intelligent breeders exist* §.'

ANGOLA SHEEP.

Skirting the south-western coast towards Guinea too little is known of the Africans, their habits, or their possessions, to justify any detailed account of their sheep. A very singular sheep, however, is found in Angola, called the *Zunu*. Its legs are long and slender, but the arms and shanks are muscular and strong. There is a slight elevation at the withers, the chest is narrow and flat, and falling in between the arms; the false ribs project, and give to the carcase a strong resemblance to that of the zebu. It is not the form which would promise much general thriftiness, and accordingly the fat is most singularly disposed. It is taken from the tail or rump, and is distributed over three parts of the animal. A small portion of it is spread over the posterior part of the loin and the commencement of the haunch. A more decided accumulation is found on the poll, and precisely of the semi-fluid character which the fat assumes in the tail, or the rump of other eastern sheep. This mass commences from the base of the ears, and extends backwards, in the form of a rounded projection, half way down the neck. Under the jaw, and commencing a little behind the angle of the mouth, and extending downwards and covering the superior part of the larynx, is a third collection of soft fatty matter, obtaining for the sheep, according to some naturalists, but improperly, for the tumour is too high and too forward, the name of the *goitred sheep*. This may be truly termed a curious variety of sheep; it is not found in any other part of the world.

The horns are very small, drooping at first, and then turning inwards and upwards; the tail, slender and almost naked, reaches very nearly to the ground. The whole animal is covered with short close hair, giving a very curious appearance to the tail. The neck and upper part of the carcase and tail are of a pale-brown colour; the head, throat, legs, belly, and the infe-

* Thompson's Travels in Southern Africa, 1827, vol. ii. p. 291.
† Burchell's Travels, p. 144.
‡ See Table, p. 101.
§ Lasteyrie on the Merino Sheep, p. 101.

rior part of the tail are white; the forehead is unusually prominent, the eyes small and sunken, the ears exceedingly large and pendulous *.

Other sheep, occupying the kingdom of Congo, are also covered with hair of a pale-brown colour, not close like the zumu, but loose and open, and with two wattles beneath the throat. The Coquo is also an inhabitant of Angola, having a greater proportion of wool under the hair, and of a finer quality, and white, with spots of a light-brown colour: the tail long and slender, but otherwise more resembling some of the European breeds. The long fat-tailed sheep, however, generally prevails. Anthony Hartwell, writing in 1597, thus describes them:—"Their muttons or sheepe are twice as grate as the sheepe of our countrey, for they divide them into five quarters (if a man may so call them), and reckon the tayle for one which commonly wayeth some twentie-five or thirtie pounds †."

THE GUINEA SHEEP.

There are two kinds of sheep on the Slave coast. One is of a small size, and not unlike the prevailing European sheep, but of not more than half their size. "They have no wool, but," says the old Dutch traveller, Bosman, "the want is supplied with hair, so that here the world seems inverted, for the sheep are hairy and the men are woolly. The flesh is dry and unpalatable ‡." Barbot gives a similar account. "The sheep are not so large as ours, and have no wool, but hair like a goat, with a sort of mane like a lion on the neck, and so on the rump, and a bunch at the end of the tail. They are indifferent meat, but serve here for want of better §."

The most numerous breed of Guinea sheep is of a very different character. The male is horned, the horns generally forming a semicircle, with the points forward: the females are hornless. According to Major Hamilton Smith, there is usually some black distributed about the sides of the head and on the neck, and in proportion as this colour spreads, the horns decrease in size, the ears become pendulous, and *wattles* are found under the throat. He saw a large Guinea ram white, but with large black spots on the head, shoulders, flanks, and legs. On the neck there was a beautiful mane of long, silky white hairs ‖.

A modern traveller says that "the sheep in Guinea have so little resemblance to those in Europe that a stranger, unless he heard them bleat, could hardly tell what animals they were, being covered with white and brown hairs like a dog ¶."

In the early part of the seventeenth century the Guinea sheep were introduced into the islands near the Texel and into Groningen, and called the *Mouton Flandrin* or *Texel sheep*. Some strangely exaggerated accounts were given of them by the writers of the day. Corneille says in his Dictionary that "they produced lambs twice in the year, and usually three lambs at a time, sometimes four and five, and, occasionally, although rarely, seven at one yeaning." This is quite incredible, and Corneille himself acknowledges that it was only on their first arrival from the East, that they were thus prolific, but it will be shown, when the European sheep are described, that the Friezland and Texel breeds were, and still are, justly valued for their size, beauty of form, and abundant produce of long and fine wool, milk, and lambs.

* Animal Kingdom, vol. iv. p. 327.

† Akeport of the Kingdom of Congo, translated by An. Hartwell, from Odoardo Lopez, p. 202. ‡ Bosman's Description of the Gold Coast of Guinea.

§ Churchill's Collection, vol. v. p. 133. ‖ Animal Kingdom, p. 326.

¶ Smith's Voyage, p. 147.

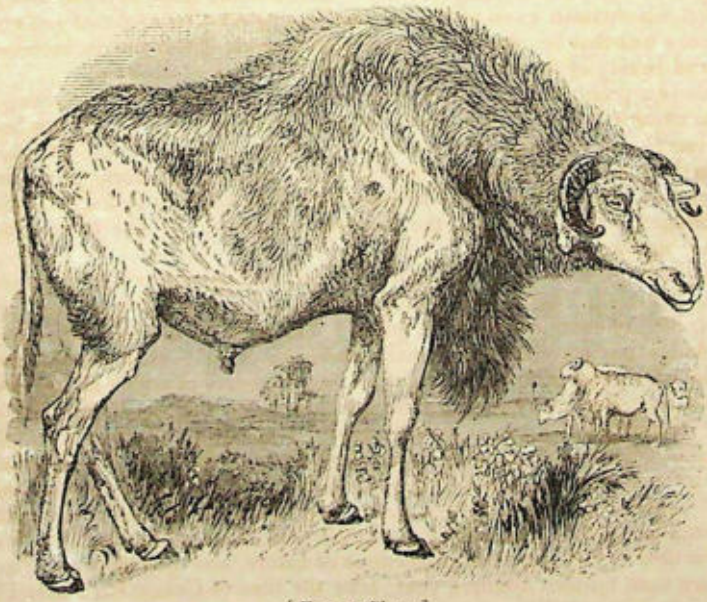
THE BEARDED SHEEP.

This part of Africa presents an apparent exception to the generic character of the sheep. This animal was said (page 1) to have no beard, but a small variety of the Guinea sheep has a considerable quantity of long hair flowing down towards the brisket. It is not, however, a beard, a growth of hair from the face or the jaw, as in the goat, but proceeding from various parts of the neck, and sometimes as low as the middle of it, and therefore the character of the sheep being preserved. M. Geoffroy St. Hilaire, in his grand work on the Antiquities and Natural History of Egypt, describes it as not larger than a common sheep, and the throat furnished with long pendulous hairs. The horns are near to each other at the base, of a square form, turning inwards, and more than usually sharp. The knees are covered with long hair hanging all round them, with an appearance somewhat resembling ruffles, and hence it has been called the "*Ovis ornata*," or *Mouflon à manchettes*. It was shot in the neighbourhood of Cairo, but is said to be more common in Upper Egypt, and to be found in all the rocky portions of the deserts of Northern Africa*.

The "Bearded Sheep" of Pennant and Shaw, the "Ovis Tragelaphus" of Desmarest, is a different animal, and a goat rather than a sheep. It is sufficient to say that it is described as having hair on the superior parts of the cheeks and upper jaws extremely long, forming a divided or double beard †.

BARBARY SHEEP.

Still pursuing the western coast of Africa in a northward direction, and traversing the kingdoms of Morocco and Fez, and then turning eastward



[*Fezzan Sheep.*]

* Dict. Classique d'Hist. Nat. tom. xi p. 264, and Wilson's Essays on the Origin and Natural History of Domestic Quadrupeds, in the Quarterly Journal of Agriculture, May, 1830.

† Pennant's Zoology, in loc.

within the Straits, and examining the productions of Algiers, and Tunis and Tripoli, the history of the sheep is indistinct and unsatisfactory. The long-legged, hairy sheep of Guinea is found in all these districts. It is largest and most numerous in the oases, or little islands of delightful verdure which are scattered over the ocean of sand that reaches from the western coast of Northern Africa to Egypt and Abyssinia. Fezzan is one of the largest of them, and has been most thoroughly explored. The preceding cut presents a portrait of one of them, in which the arched forehead, the pendulous ears, the shaggy hair, the dewlap beneath the throat, the disproportionate length of the legs, and the general characteristic gaunt and thriftless appearance of the animal, cannot fail of being recognised. This sheep belonged to the Zoological Society of London.

MOROCCO SHEEP.

Major Hamilton Smith* says that the Morocco breed has long wool, the hair on the neck rather shorter and more undulating, and of a rufous brown; the ears small and horizontal; the horns small, but turning spirally outwards; the scrotum forming two separate sacs; the general colour white, with some marks of liver colour. A specimen sent by one of the princes of Morocco was in the possession of Sir Joseph Banks.

This is the first African sheep that in the least approaches to the expectations that are naturally raised respecting it by several undoubted historical facts. Columella, the uncle of him to whom we are indebted for a scientific and instructive work on agriculture (it is not a little disgraceful that it has never appeared in an English dress), lived near Cadiz during the reign of the Emperor Claudius. He happened to see some African rams, that were destined for exhibition, and probably cruel death, by wilder animals in the Roman Amphitheatre. He bought some of them, and he crossed his Spanish ewes with them; and his nephew tells us that the consequence was that he obtained a breed that resembled the sire in increased size and beauty of form, and the dam in the softness of the wool.

This is a proof, not to be disputed, of the value of the Barbary sheep at that time; and if it really possessed any good qualities, they would have been discovered and diligently cultivated, when some portion of the North of Africa had rivalled the metropolis and the mistress of the world in civilization and its attendant arts, and had not only been superior to her in extent of commerce, but had been the general emporium of the eastern and western worlds.

Of the high state of civilization to which the inhabitants of Northern Africa had risen, long before the importation of the first Barbary sheep into Spain, history contains sufficient proof; and even in the interior of Central Africa the traveller occasionally finds traces of ancient magnificence on which he gazes with wonder, but of the founders of which all memory has ceased. For many an age after the barbarians had swept away almost every vestige of civilization in the countries of Europe, literature and the arts, and doubtless the art of agriculture among the rest, found refuge among the dusky inhabitants of these regions; and the travellers who have lately penetrated deeply into Central and Southern Africa have given accounts altogether unexpected, and, therefore, for a while disbelieved, of many a district rich in all the productions of nature, and the resources of art.

More than thirteen hundred years after the time of Columella, Pedro IV. of Spain, whether judiciously or otherwise does not clearly appear, imported several Barbary rams for the supposed improvement of the Spanish sheep; and two hundred years subsequently, the Cardinal Ximenes had recourse to

* Animal Kingdom, vol. iv. p. 326.

the African rams for the same purpose. The whole of the northern coast of Africa has, however, been now explored, and with the exception of the *Morocco breed*, described by Major Smith, scarcely a native African sheep has been met with that deserves cultivation.

What is the evident conclusion from this, but that the sheep is the child of cultivation? It may be bred and managed so as to become almost all that the agriculturist and the manufacturer could wish it to be; and if habitually neglected and abused, every good quality will gradually disappear.

In this *Morocco breed*, however, with its long wool and prevalent white colour, some capability of former or of future improvement may be easily imagined; and the ingenious naturalist to whom reference has just been made gives a description of another variety of African sheep, more plainly developing the inherent tendency to improvement. "The last African race," says he, "we shall notice, is found in Barbary, and even in Corsica. It is policerate (more than two horns), with pendulous ears, and the tail not much widened; white in colour, posterior parts covered with wool; and from the head to the shoulders, with loose, soft hair. A crossed breed of this race with the Guinea sheep, and brought from that country, was in the possession of R. Wilding, Esq. It was entirely covered with soft, silky hair, of a silvery whiteness; on the fore and hind part of the neck the hair was of great length, especially in front; half of the nose was jetty black; on each knee and each thigh a black spot; the fetlocks and feet white. In the month of November, it began to assume a soft, woolly coat, like that of the English sheep*."

THE TUNIS SHEEP IN AMERICA.

A still more satisfactory account of the capability of the Barbary sheep is given by Mr. Peters, of Lancaster county, in the United States. It is extracted from the Philosophical Society of Philadelphia, of which he was President. He imported some sheep from the neighbourhood of Tunis. They were hornless, and their bones small. A ewe that was killed fat, weighed 182 lbs. The fat was laid on the profitable points; it was mingled with the flesh, which was marbled in a striking degree. The mutton was acknowledged to be among the finest and best in the market; and the proportion of flesh to the size of the animal was remarkably great. The tail weighed from six to eight pounds, and, says Mr. Peters, "if properly dressed, is a feast for an epicure. The tail of a young beaver, which I have enjoyed when I dared to indulge in such food (when free from a fishy or sedgy taint, to which at certain seasons the flesh of amphibious animals is subject), is the only rival I know."

The sheep were hardy, would bear cold and heat well, would fatten with little food, and much quicker than most other breeds. They were kept in condition on coarse food, and their character was that of gentleness and quietude. The lambs were dropped white, red, tawny, bluish, or black,—but the fewest of the latter. All, except the black, grew white in the colour of their fleece, although some few spots were generally left. The cheeks and shanks, and sometimes the whole head and face, were either tawny or black.

Of the fleece, he says that these sheep were better set with wool than any others that he knew in America,—the weight from 5 lbs. to 5½ lbs. and useful for a variety of purposes. He never saw better home-made cloth than the selected parts of the Tunis fleeces, and especially the cut next the pelt afforded; and, alluding to their peculiar management, or

* Animal Kingdom, vol. iv. p. 329.

but their wool is long, and of a very coarse nature. Another gentleman in Hertfordshire kept three or four of these Turkey-sheep; one of their tails weighed 8 lbs.; and one of their lambs at shearing-time weighed 16 stones alive*."

THE ASIATIC SHEEP.

Returning to Asia,—the character of the sheep, in early times, in Palestine and Syria, and that part of the Eastern country over which the primitive shepherds wandered, has been already sufficiently described; and it remains only to say, that although three thousand years have since elapsed, they have not materially changed. A few of the fat-rumped, but more of the broad-tailed, variety are seen. In the latter, the carcase is in a great degree neglected: the hairy or woolly covering of the animal being coarse, is comparatively valueless; while the fatty portion of the tail is increased to one-fourth, and sometimes to one-third, of the weight of the whole animal.

In *Stony Arabia*, and the still more southern part of Arabia, the fat-rumped species is almost exclusively found; and the wool was once highly prized, and is still valuable.

THE PERSIAN SHEEP.

In *Persia*, more of the fat-tailed sheep are found than of the fat-rumped already described (p. 23); but although they constitute one of the chief sources of the wealth and property of a large class of the inhabitants, no care is bestowed on their improvement. The shepherds still follow the wandering life of their ancestors three thousand years ago. Fraser gives a singular account of the march of one of the tribes. It will be interesting to compare it with the peregrinations of the primitive keepers of sheep already described.

"When the pastures are bare, they shift to some other spot. The march of one of these parties is a striking spectacle. The main body is generally preceded by an advanced guard of stout young men, well armed, as if to clear the way; then follow large flocks of all kinds of domestic animals, covering the country far and wide, and driven by the lads of the community. The asses, which are numerous, and the rough, stout yaboos (small horses), are loaded with goods, tents, clothes, pots and boilers, and every sort of utensil, bound confusedly together. On the top of some of the burdens may be seen mounted the elder children, who act the part of drivers; and on others the lesser urchins not able to speak, yet quite at their ease, neither seeking nor receiving attention, but holding on manfully with feet and hands. A third class of animals bear the superannuated of the tribe, bent double with age, and hardly distinguishable from the mass of rags that forms their seat. The young men and women bustle about, preventing, with the assistance of their huge dogs, the cattle from straying too far. The mothers, carrying the younger infants, patiently trudge on foot watching the progress of their domestic equipage. The men with sober, thoughtful demeanour, armed to the teeth, walk steadily on the flanks and rear of the grotesque column, guarding and controlling its slow and regular movement†."

Much wool is grown in those districts of Persia, where the majority of the inhabitants lead a pastoral life; the best is found in the province of Kerman. This is a very mountainous country, hot and dry in summer, and intensely cold in winter. The wool of the sheep is fine in quality, and that which grows at the roots of the hair of the goat is nearly as fine.

* Ellis on Sheep, p. 49. † Fraser's Persia, p. 370.

The latter is spun into various fabrics, which almost vie with the beautiful shawls of Cashmere. The *numuds*, or fine felt carpets, for which Persia is so celebrated, are manufactured from the wool of the sheep, either in Kerman or Khorasan*. These districts are far distant from each other, but the sheep in both of them "is remarkable for the fine spirally-curled wool, of a grey, or mixed black and white colour, which is obtained from it. The sheep are below the ordinary size, the horns of the ram curved back and spiral at the tip, the ears pendulous, the colour dirty white with a fine grey wool beneath, and the tail not very broad. The fine furs are from the lambs slaughtered with their dams a few days before yeaning†."

At Kabooshan, in the mountains north of Khorasan, is a celebrated manufactory of sheep-skin pelisses, called *posteens*. The skins, having been dressed with the wool on, are cut into narrow stripes; the coarser and inferior portions are rejected, and the others sewed together with the wool outside, and made into pelisses, which are almost universally worn in the winter. The best are formed from the skins of unweaned lambs, and are exceedingly fine and light: the price of these is often enormous. The next in value are from the skins of selected sheep, not more than a year old; the coarser skins are used for the poorer people‡.

The singular difference in the colour and brilliancy of the fleece of the Persian sheep contributes to give greater variety and value to these garments. In some breeds of sheep, the hair is only sufficiently long to admit of one curve, which lies close on the skin, and has a pleasing appearance; in others the fibre, although three inches long, is scarcely curved, except at the extremity; and some have long, grey, shining wool, falling in numberless ringlets, and appearing behind like strings of pearls§.

Wild sheep frequent many of the mountains of Persia, and especially those in the neighbourhood of Nishapoore. Fraser thus describes one of them:—"While I was in the village a ram of this description was killed by one of their hunters, and brought to me as a present. It was a noble animal, just what it might be conceived the finest sort of domestic ram would be in a state of nature; bold, portly, and very strong; thick like a lion about the neck and shoulders, and small in the loins; covered with short reddish hair that curled closely about the neck and fore-quarters, and bearing an immense pair of crooked and twisted horns. Its flesh, of which we ate a part, was remarkably well-flavoured‖."

TIBET SHEEP.

The sheep of Tibet are numerous. They are chiefly a small variety of the fat-rumped Persian and Abyssinian, with black heads and legs. Some of them have a small portion of wool at the root of short hair, but in other breeds the wool is long, soft, and fine. Many of the costly Indian shawls are made of the long wool. The skins of the others are usually prepared with the wool on them, and form, like the skins of the Persian sheep, very comfortable winter clothing. The inhabitants of Tibet are too indolent to take any advantage of the excellent materials which their country produces, and a considerable proportion of their wool is sent into Persia and British India to be manufactured.

The flesh of the Tibet sheep is said to be peculiarly well-flavoured, but

* Fraser's Travels on the banks of the Caspian, p. 359.
† Animal Kingdom, vol. iv., p. 329.
‡ Fraser's Journey through Khorasan, p. 573.
§ Ogilby's Asia, p. 38.
‖ Fraser's Journey through Khorasan, p. 421.

the inhabitants mostly eat it dried and raw; it is said, however, that when cured in the frosty air, it is not disagreeable to the most fastidious European palate.

The Tibet sheep are occasionally employed as beasts of burden. Captain Turner says, that he has seen whole flocks of them in motion, laden with salt and grain, each carrying from 12 to 20 lbs*.

EAST INDIA SHEEP.

Descending from Tibet towards the south, the British East Indian possessions occur. The history of the native and imported sheep in that extensive country is very defective. All that can be certainly gathered is, that in many of the northern districts the animal is small, and the fleece consists of coarse and frequently black wool and hair, altogether unsuitable for clothing purposes. Small rugs or coverlets are made from it, principally used by the shepherds and the most inferior castes. The greater part of them are of the fat-rumped and fat-tailed breeds, and the first more especially prevail in the upper districts. Mr. Hodgson, however, describing the northern division of Nepâl, (Nepaul,) and giving a long account of a variety of the Musmon, and to which allusion will again be made, when the Argali and Musmon are described, says, that "the wool of the Huniah or Bhotean domesticated sheep is superb, but it is suited only to the northern region of Nepal, suffering much from the heat of the central district." He suggests that attempts should be made to naturalize this breed in England †. Many sheep are found with considerable resemblance, in form if not in fleece, to the Persian in the peninsula, and particularly in the Mysore country. They are without horns; they have small and drooping ears, and the wool fine, with numerous curves, and adapted to many clothing purposes. Sir Joseph Banks had a specimen which belonged to the park of Tippoo Sultan at Seringapatam ‡.

Colonel Sykes thus describes the variety of sheep most extensively bred in Dukhun (the Deccan). It has short legs, short thickish body, and arched forehead. The wool is short, crisp, and harsh, and is almost universally black. In most individuals there is a white streak or line from the anterior angle of each eye towards the mouth, and a white patch on the crown of the head §.

This sheep is smaller than any of our English breed, and often not weighing more than eight or ten pounds a quarter. The mutton is exceedingly good. By the kindness of Colonel Sykes the author was enabled to examine a small portion of the wool. The following is a delineation of it as developed by the microscope.





[*Wool of the Deccan Black Sheep.*]

1. The wool seen as a transparent object; the serrations very indistinct and small, as if the cups scarcely projected. There were only eight serrations in the field of view, and consequently only 1280 in the space of an

* See Captain Turner's Account of an Embassy to Tibet, p. 302, &c., and Pinkerton's Geography, article Tibet.

† Proceedings of the Zoological Society of London. 1834. Part II. 99.

‡ Animal Kingdom, vol. iv., p. 330.

§ Proceedings of the Zoological Society, 1830-31. Part I. p. 105.

inch. The curves were also very few. The fibre, however, was not more than $\frac{1}{1000}$th part of an inch in diameter.

2. The wool seen as an opaque object. On account of its black colour it was very difficult to bring out its true structure; nevertheless a few of the leaves constituting the cups may be seen bearing a near resemblance in shape to the bay-leaf. They are very irregularly scattered. It will be evident, that on account of the fewness of the curves, and also the paucity and shallowness of the serrations, this wool can never be valuable as a clothing wool; it is only used in the manufacture of blankets, carpets, and coarse goods of this description.

THE CEYLON SHEEP.

At the point of the peninsula is the island of Ceylon. Very contradictory accounts have been given of the breeding and keeping of sheep in this island. Some have asserted that it is almost impossible long to preserve a flock of sheep in Ceylon; and, in fact, it is only at Jafnapatam that they have ever been bred or pastured with success. The difficulty, however, does not seem to consist in any deficiency of pasture, or any noxious quality that it generally possesses, or any deleterious atmospheric influence prevalent in the island; but Ceylon abounds with bears, jackals, alligators, and enormous serpents, by whom so many sheep are occasionally destroyed, that the sheep-owner abandons the cultivation of that animal in despair. Some particular spots, nevertheless, are said to abound with poisonous plants, and whole flocks of sheep straying there have been lost *.

THE JAVANESE SHEEP.

Of these there are two varieties. They are both of a moderate size, but some have a pendulous growth beneath the jaw; the coat consisting principally of hair; the tail unusually large and fat, and weighing occasionally forty or fifty pounds: they are short-legged, and of a red and white colour. The other variety is white, with exceedingly long and pendulous ears; it yields much milk, so as to be useful for the purposes of the dairy, and is clothed with prettily curled wool†.

The other islands in the Indian and Pacific Oceans, containing principally, and some of them exclusively, the Spanish sheep, will be passed over until the peregrinations of that excellent breed are traced.

Of the Island of Japan, situated more northerly on the western coast of Asia, Thunberg (strangely, and probably truly) says that there are no sheep to be found in the whole of it‡. There is scarcely another part of the globe, of any considerable size, of which this could be affirmed.

CHINESE SHEEP.

Returning now through the interior of Asia, the immense empire of China first presents itself; and, as might be naturally expected in such an extent of country, breeds of sheep, differing much from each other, are found. First is the Long-legged Sheep, resembling the African Adimain breed. They are not quite so high on their legs as the African sheep; the horns are middle-sized, and curved; the forehead is arched; the neck short, with a collar of hair reaching from the nape of it to the shoulders; the head, the legs, and the mane are of a red brown colour; the tail is long, and the wool short and coarse §.

* Agricultural Magazine, November, 1805.
† Niehoff's Travels (Churchill's Collection), vol. ii. p. 320.
‡ Thunberg's Travels, vol. iv. p. 95.
§ Animal Kingdom, vol. iv. p. 330.

More to the south the fat-rumped sheep prevail, yielding every variety of wool; and in the same districts are found a smaller, lower sheep, of a more European character, and producing a fine and very useful long wool. The Chinese manufacture some good serges from it, not so close as those made in Europe, but thinner and finer, and having a peculiar silky appearance. They likewise prepare a considerable quantity of felts of various colours. The largeness and beauty of the Chinese carpets have often been praised. An old traveller says, that "when the Dutch presented the Emperor of China with some scarlet and other cloths made in Europe, he asked how, and what they were made of? Being told, he replied that his subjects could make them, and, therefore, there was no need to bring them so far*."

TARTARIAN SHEEP.

The wilds of Central Asiatic Tartary present nearly the same breeds of sheep, and the same management and the same modes of life in the owners, that have been already described when those districts were considered that bordered on the country which the primitive shepherds traversed. The fat-rumped sheep chiefly occupy Southern Tartary—the broad-tailed ones are found in Northern and Middle Asia. In the former there is considerable variety in the shape, and size, and fleece, and particularly in the number of horns. The four-horned sheep are numerous in several parts, and a few have six horns; the forehead is convex, and there are wattles under the throat. In the latter there is some, but less difference of size, and of accumulation of fat on the loins. They are more disposed to general good condition, and the quality of the fleece is better.

THE ARGALI.

Amidst the highest mountains of Central Asia lives the ARGALI, deemed, by some authors, but erroneously so, the parent of all the varieties of the domestic sheep. He is one of the few remaining wild sheep; and as such, and on account of his superior size and beauty, as well as the relation in which he has been supposed to stand to sheep generally, deserves particular notice. The account given by Pallas will be chiefly followed, for he describes that which he had actually seen.

Before Siberia was colonised, the Argali used to frequent the lofty mountains extending from the river Irtisch to Kamtschatka; but now, shunning the neighbourhood of man, it has retreated to the more perfect deserts of Kamtschatka in the north, to the Mongolian and Songarian mountains towards the centre of Asia, and to the steeps of Caucasus in the south.

When it is found, it is usually on some barren but not very lofty rock, where it can bask itself in the rays of the sun, and see the possible approach of danger on every side. It does not, however, occupy the highest part of the mountains on which it grazes. The ibex, an inhabitant of the same rocks, ranges far above it. Although it flies to these precipices for security, it does not, like the ibex, delight in the cold, but seeks as warm a situation as such desert regions can afford.

The Argali is about the size of the fallow deer, but is very differently formed. Its legs and its neck are shorter, and the muscles of its limbs are stouter; it displays more bulk than the deer, and promises more strength than speed. The male is considerably larger and stouter than the female; he is three feet high at the withers, and sometimes weighs more than 200 pounds.

* Navarette's Account of China (Churchill's Collection), vol. i. p. 45.

The head is that of a ram, but the ears are small in proportion to the developement of the head, and erect. The horns are of an enormous size, nearly four feet in length, and with a hollow so considerable, that young foxes occasionally conceal themselves in those that have been accidentally shed. According to Major Smith, "they rise near the eyes, before the ears, occupying the greater part of the back of the head, and nearly touching above the forehead, bending at first backwards and downwards, then to the front, and the points finally outwards and upwards; the base is triangular; the broadest side towards the forehead, the surface wrinkled crossways to beyond their middle, and the extremity more smooth*." The horns, however, as in the subjoined cut, differ materially in different animals. The horns of the Argali of Caucasus are rounder, heavier, and larger throughout their whole course. The horn of either species, with its bony basis, will weigh 14lbs. or 15lbs.

The following is a cut of the head and horns of the Asiatic Argali, taken from a specimen in the collection of the Linnæan Society.



[*Asiatic Argali.*]

The summer coat consists of short hair, smooth, and resembling that of a deer. The winter coat has a longer external coat of hair, but concealing a thick and soft layer of wool. The colour is of a reddish-brown in summer, changing to a brownish-grey in winter; and the inner coat of wool is always white. Both in winter and summer there is a large disk of a buff colour on the haunch.

The horns of the female are shorter and smaller, and nearly straight; her colour is likewise paler, and there is no buff coloured spot on the haunch. The throat is covered with longer hair, and the tail is very short.

The Argalis are generally found in flocks of eight or ten in number. The males during the rutting season fight furiously; but otherwise this is a timid, or cowardly animal, and rarely offers resistance when pursued. They are said to breed twice in the year, viz., in spring and in autumn. The female seldom produces more than one at a birth, and the young lamb is covered with a soft, gray, curling fleece, as in many of the half-domesticated breeds of sheep, and which, by degrees, exhibits the usual mixture of hair and wool in these animals. From the commencement of the spring to the approach of winter, they pasture in the little secluded valleys, among the mountains and become very fat, and in high request. As winter approaches they descend lower, and there, from scarcity of food and constant fear and alarm they lose all their condition, and when the time arrives for their return

* Animal Kingdom, vol. iv. p. 317.

the mountains, they are, except for the sake of their skins, comparatively worthless. When pursued they exhibit all the fear and peculiar gait and manner of the sheep; they run from side to side, and stop every moment to look at their pursuers; yet, as their flight is uniformly towards the most inaccessible parts of the mountains, the chase of them is frequently attended by no little danger. The young ones are very easily tamed, but no severity or kindness will render the adult animal tractable*.

A variety of the Argali is found in North America, and was long known by the name of the sheep of California. The Canadian free traders recognized it by the title of Culblane. The Abbé Lambert gives the following account of it:—"Besides several sorts of animals known among us, there are two sorts of fallow beasts unknown in Europe. They call them sheep, because they have the figure of our sheep. The first species is as large as a calf one or two years old. Their head has a great resemblance to that of a stag, and their horns to those of a ram. Their tail and hair, which are speckled, are shorter than those of a stag, their flesh is very good and delicate †."

Mr. M'Gillivray, in his account of his travels in the Rocky Mountains, gives the first scientific account of it. He describes it as resembling the Asiatic Argali in size and form, but having still larger horns, not quite so close at their roots, covering the greater part of the forehead, proceeding at first decidedly upwards, then turning suddenly downwards for nearly one third of the length of the neck, after this once more bending upwards, and terminating in a sharp point. The face and mouth white, the cheeks, neck, back, and limbs of a grey and rufous dun colour, and the tail and buttocks of a white buff.

They are found in troops of thirty or forty, on the steepest ridges of the mountains, but in winter they descend nearer to the plain.

The following cut is delineated from a specimen in the Museum of the Zoological Society of London.



[*American Argali.*]

Major Hamilton Smith adds, that "if the American species be the same as the Asiatic, which appears very probable, it can have reached the New World only over the ice by Behring's Straits; and the passage may be conjectured as comparatively of a recent date, since the Argali has not spread

Animal Kingdom, vol. iv. p. 318; Quarterly Journal of Agriculture, vol. ii. p. 369; rations of Natural History, vol. i. p. 146; and Anderson on Sheep.
mbert's Observations on Asia, Africa, and America, vol. i. p. 130.

eastward beyond the Rocky Mountains, nor to the south farther than California *."

THE MOUFLON OR MUSMON.

Buffon and Wilson have considered this sheep as identical with the Argali. Major Smith seems to regard it as a variety of the Argali. It will therefore be necessary, although travelling into another quarter of the world, to describe the mouflon. It inhabits the mountains of Corsica and Sardinia, and has been found in Crete, Cyprus, and some other of the islands of the Grecian Archipelago. It formerly abounded in Spain, and it was known to the early naturalists; Pliny describes it under the names of musmon and ophion. He says that "there is in Spain, but especially in the Island of Corsica, a kind of musmones not altogether unlike to sheep, having a shag more like the hair of goats than a fleece with sheep's wool. The kind which is engendered between them and sheep, they called in old time, *umbri*."



[*The Mouflon.*]

Mr. Wilson gives the most correct account of this animal. It is usually about two feet and a half in height, and three feet and a half from the nose to the commencement of the tail. The horns never exceed two feet in length; they are curved backwards, and the points turn inwards; the roots of the horns are very thick, and wrinkled; the ears are of a middle size, straight and pointed; there is the rudiment of a lachrymal opening as in the deer; the neck is thick; the body round; the limbs muscular; and the tail short. The colour is generally of a dull, or brownish-grey, with some white on the fore part of the face and on the legs; a tuft of longer hair beneath the throat; a dark streak along the back; and the upper part of the face black, with black streaks along the cheeks: the mouth, the nostrils and the tongue are also black, and a spot of pale yellow is on the side

* Animal Kingdom, vol. iv. p. 319.

The forehead of this sheep is particularly arched. The females are generally without horns, and where they do appear, they are considerably less than those of the male.

The musmons rarely quit the highest parts of their native mountains; but the temperature of the countries in which these sheep are usually found does not admit of perpetual snow. They congregate in herds, seldom exceeding a hundred individuals, and, in the winter, the herds divide themselves into lesser groups, consisting of a male and a few females. The young ones are generally dropped in April or May, and are carefully attended to by their dams.

The musmon is covered by a fine hair of no great length, having beneath it a thick, grey-coloured wool, short, but full of spirals, and the edges thickly serrated*.

Cuvier says that domestication has little effect in developing any good quality in these animals, and that they rarely exhibit either intelligence, confidence, affection, or docility. He speaks of those that were in the Menagerie at Paris, of which he was the director; and his account very much coincides with observations made by the author of this work in the gardens of the Zoological Society of London. They were by many degrees more stupid and mischievous than any of the other breeds of sheep which that Menagerie contained. Major Hamilton Smith says, that their skins are used for various purposes; and in the islands of Corsica and Sardinia the mountaineers still convert them into vests, and a kind of cloaks, which may be the present representatives of those noticed in the Commentaries of Cæsar, as made from the skin of the *musmo* (musmon)—a dress that was much worn by the inland robbers†.

NORTH AMERICAN SHEEP.

Until the introduction of the Merinos into North America little that was satisfactory could be affirmed of the sheep of any part of that country. Many portions of the United States, and even of Canada, possessed advantages for the breeding of sheep that were not surpassed in Europe. The country was undulating or hilly,—the hills covered with a fine herbage,—the enclosures more extensive than in the best breeding districts of England,—almost every pasture furnished with running water, and sheltered, more or less, by trees, against the summer's sun; yet the sheep were of the commonest kind: there was a prejudice against their meat; a prejudice against them altogether; and there was scarcely a district in which the wool was fit for any but the coarser kind of fabrics‡.

It might have been thought to be the policy of the mother country to foster a prejudice of this kind, in order that her colonies might be as dependent as possible upon her; and particularly that her woollen manufactures might there find a ready sale: accordingly the American sheep, although somewhat differing in various districts, consisted chiefly of a coarse kind of Leicester, and these were originally of British breed. The "American Husbandry," published in 1776, describes the New England wool as "long and coarse, and manufactured into a rough kind of cloth, which is the only wear of the province, except the gentry, who wear the finer cloths of Britain."

* Wilson on Domestic Animals, in Quarterly Journal of Agriculture, vol. ii. p. 359. See also the Animal Kingdom, vol. iv. p. 322.

† Animal Kingdom, vol. iv. p. 324.

‡ A writer in the Farmer's Magazine thus expresses himself:—"In the western parts of Virginia sheep are well managed, for there is no prejudice against mutton. In the Eastern States there are good sheep pastures, and a moderate dislike of mutton: in Kentucky, the farmer would dine upon dry bread rather than taste his own mutton."

A writer in the Farmer's Journal, March, 1828, confirms this account, and applies it, but somewhat unfairly and unjustly, to the American sheep at that late period. "In a very few instances in British America I found a small number of the Leicester breed, but no good ones; but on my crossing the United States, I found none but ordinary, or what we should term very bad ones. The best American fleece I ever saw was not better than a middling Cambridge one, and in no place did I find any that would do for, or that could be applied to bombazine, or even fine stuff."

Mr. Livingston, who wrote in 1811, describes some exceptions to this general character of the American flocks. The first is a very singular one. "The Otter sheep were first discovered on some island on the eastern coast, and have spread to the adjoining states. The sheep are long bodied rather than large, and weigh about 15 lbs. a quarter. Their wool is of a medium fineness, and a medium length; but that which particularly characterises these sheep is the length of their bodies, and the shortness of their legs, and which are also turned out in such a manner as to appear rickety. They cannot run or jump, and they even walk with some difficulty. They appear as if their legs had been broken, and set by some awkward surgeon. They can scarcely exist in a deep country, and they cannot possibly be driven to a distant pasture or market*."

The Arlington long-woolled sheep, originally bred by General Washington, descended from a Persian ram and some ewes of the Bakewell flock. The sheep retain much of the form of the Improved Leicester, and the staple of the wool is occasionally 14 inches long; it is soft, silky, and white, and calculated for hose, camblets, serges, and other fine woollen fabrics.

A peculiar breed of sheep is found in Smith's Island, on the Eastern Cape of Virginia, and supposed to be the indigenous race of that part of the country. The size and form and fattening quality of the animal is far superior to those of the Merino—the fleece is heavier, being from five to nine inches in length, and it is so fine, as to be adapted for every purpose to which the Spanish wool can be applied. This account is given on the authority of Mr. Custis, the proprietor of the island; but further examination, although proving that the breed is valuable, both on account of its carcass and its wool, does not justify the high terms in which they have been frequently spoken of.

Since the prohibition of the exportation of British sheep has been removed, the finer Leicesters and other breeds have found their way across the Atlantic, and materially changed the character of some of the American flocks. The Merinos have also reached the United States, and have been used in several of the northern provinces in improving some of the best American breeds. Mr. Livingston was very zealous in effecting this, and the system has been extending with decided advantage: it has reached even to the British colonies. Mr. M'Gregor calculates the number of sheep in Canada and the other northern transatlantic colonies to be 1,247,658; and a writer in the Onondago Journal says that "it would not be wide of the truth to put the whole number of sheep in the Union at thirteen millions, which, yielding an average 3 lb. of wool per head, will give a product of thirty-nine millions of pounds, and constitute not an unimportant item in the estimate of national wealth." An increasing quantity of wool begins now to be imported by the mother country from her American Colonies, and from the United States. In 1833 it amounted to 335,649 lbs.; but on the other hand the exports of woollen manufactures from England to those countries amounted to nearly three millions of pounds sterling †.

* Essays on Sheep, p. 61.

† M'Culloch's Dictionary of Commerce, Art. Wool.

WEST INDIAN SHEEP.

The Jamaica sheep have already been described (p. 59). They have been bred there since the first discovery of the island. They are small; but the flesh is good, and the wool, although deteriorated by admixture of hair, is peculiarly fine and soft. On account of this admixture, however, it has not been applied to any valuable manufacturing purpose. Little attention is paid to the cultivation of sheep in many of the West Indian Islands.

SOUTH AMERICAN WOOL.

Almost the whole of the South American wool is the production of Spanish sheep that have been taken over there, and that have multiplied to a very great extent. Both the sheep and the fleece have considerably degenerated, and too many hairs having begun to mingle with the wool, and to over-top it. It is very little valued, and is used chiefly for making list for broad-cloths, carpets, and a few other coarse articles*. The natives of South America use it in the manufacture of mattresses, pouches, baizes, friezes, &c. 220,000 lbs. of it were imported into England in 1833, but on the other hand, the exports to South America in woollen manufacture were of the declared value of 658,000*l.*† In a report made to the French Agricultural Society respecting Brazil, a singular circumstance is mentioned respecting the sheep, which are said to be very much deteriorated, viz., that if any flock is kept ten years on the same pasturage, disease breaks out among them, and great numbers die,—but if they are transported to another soil, although at a very inconsiderable distance, they renovate and flourish anew‡.

CHAPTER V.

The History of the European Breeds—the Russian—Wallachian—Moldavian—Greek—Cyprus—Sicilian—Italian—Piedmontese—Savoy—Swiss—Spanish, Stationary and Migratory—the Spanish Sheep in other countries—the Swedish sheep—French—Norwegian—Danish—Feroe—Iceland—Azores—German—Saxon—Silesian—Prussian—Hungarian—Hanoverian—Flemish—Anglo Merinos—Australian—Van Diemen's Land—Cape.

The survey of European sheep will commence in those districts that lie nearest to the habitation of the primitive breeds. Russia, therefore, will first be considered, the greater part of her extensive territory being to the present day traversed by wandering shepherds.

THE RUSSIAN SHEEP.

Far more attention continues to be paid to the breeding of sheep, than that of cattle, through almost the whole of this immense empire. All the wandering tribes possess a great number of sheep. Many of the inferior Boors and Cossacks in southern Russia have flocks consisting of many hundreds of these animals.

The characters of the sheep differ materially in the various districts. Towards the north they are small, short-tailed, and bear a coarse and harsh wool. About the river Don, and still more towards the centre, and on the banks of the Dneiper, and in some districts of the Ukraine, they yield a better wool; and thence the greater part of the material for the inland cloth

* Walton on Peruvian Sheep, 1811. † M'Culloch, Art. Wool.
‡ Annales de l'Agric. Fran. Jeuillat, 1834.

manufactories is supplied. In the neighbourhood of the Baltic a still superior breed is found, and the Dago and Oesel islands near the gulf of Finland are celebrated for their wool. The half-cloths that are manufactured from it have often as fine and close a substance as that which is imported from Great Britain. The finest of the Russian wools are exported from Odessa on the Black Sea. It is the produce of all the neighbouring provinces, but principally of the Crimea. There is no district in the empire so fitted by nature for the pasturage of sheep.

There are three kinds of sheep in the Crimea and in Taurida. The common breed is white, or black, or grey, with very coarse wool, and a long tail covered with fat. They are kept in exceedingly large flocks. A rich Tâtar will frequently possess 50,000 sheep. They wander from the mountains to the sea-coast, according to the season of the year. The grey sheep produce the grey lambskins, 30,000 of which are exported every year. During the independence and prosperity of that country, they were destined principally for Poland, where they were sold at a very high price. Fifty or sixty thousand black lambskins, which are also much valued, are exported from the Crimea.

The mountain sheep are smaller than those on the plains. Their wool is beautifully fine, and, even before the improvement which many of the flocks have undergone, used to find its way to the French manufactories. The Crimea was scarcely in the possession of Russia ere many attempts were made to improve the sheep, naturally so valuable. The Merinos were in process of time introduced here, as into every other part of Europe. A few have been cultivated as a pure flock; more have been employed in improving the native breeds, and the consequence is that the wool exported from Odessa is increasing in quantity and value every year. In 1828, 184,000 lbs. of wool were shipped from this port; in 1831 that quantity had increased to more than 1,260,000 lbs.*

The following is a delineation of a fine sample of Odessa wool:—



[*Odessa Wool—Transparent and Opaque.*]

The staple was from four to six inches in length; the curves numerous; and the general feeling of the wool very soft.

When viewed as a transparent object, the diameter of the fibre is $\frac{1}{1\,6}$ th of an inch, being the same as that of Lord Western's Merino wool, delineated in page 88. The serrations are 13 in the field of view, or 2080 to an inch —not so numerous as Lord Western's Merino, and much less so than the Saxony wool, page 89.

The serrations are distinct, and nearly at right angles, but not very hooked or prominent.

As an opaque object the leaves of the cup are beautifully distinct. They are long, and rather rounded, with a little peak in the centre, like the leaves of an artichoke.

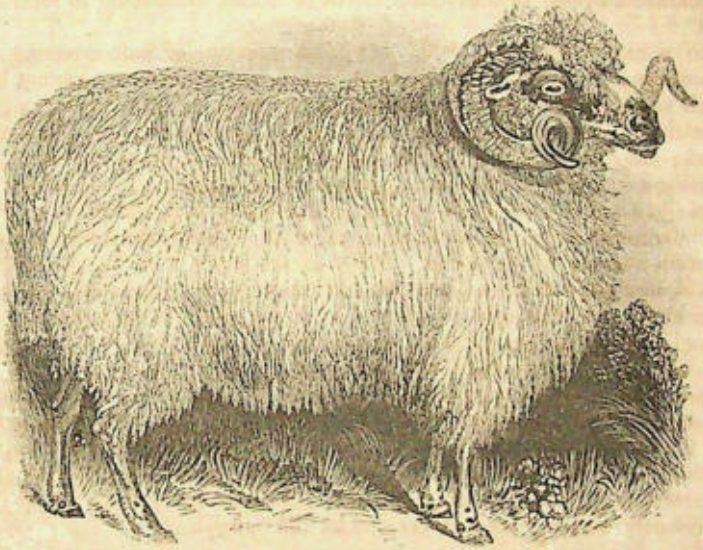
This wool evidently possesses very high felting properties, and is a valuable material; but it is inferior to the Merino, and most decidedly so to the Saxony.

* M'Culloch's Dictionary, Art. Odessa. Pallas's Voyage in Russia, vol. i. p. 402.

THE WALLACHIAN SHEEP.

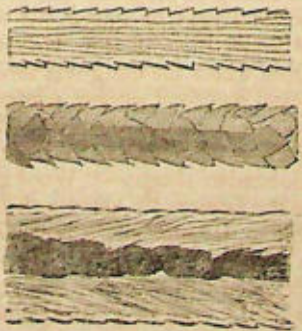
Proceeding down the coast of the Black Sea, the Wallachian sheep deserve attention. The great size and spiral form of the horns, and the long and silky-looking fleece, give them a noble appearance.

The following is the portrait of one of them in the Menagerie of the Zoological Society of London.



[*The Wallachian Sheep.*]

The horns differ as materially in the two sexes as they do in some of the British sheep. In the ram they usually spring almost perpendicularly from the ridge of the frontal bone, and then take a beautiful spiral form. In the female they protrude nearly at right angles from the head, and then become twisted in a singular way. The Wallachians are about the size of the Dorset sheep, but not so tall:—they are usually white, the ears are small and pendent, and the tail long; the fleece is also long—it is composed of mingled wool and hair—the hair having a few curves, and these producing a pleasing appearance on the back of the animal*. The wool of this sheep was submitted to the power of the microscope.



[*Hair and Wool of the Wallachian Sheep.*]

* Quarterly Journal of Agriculture, vol. ii. p. 542. Livingston on Sheep, p. 19. Illustrations of Nat. Hist. p. 145.

The hair is here viewed as a transparent object. It is $\frac{1}{3}\frac{1}{2}$th of an inch in diameter. It is decidedly serrated. There are 1600 serrations in the space of an inch. These are very irregularly placed, and there is a line running up the centre, giving the idea of a tubular structure.

The wool is deficient in curves; but it has 2080 serrations in an inch, and it is the $\frac{1}{7}\frac{1}{8}$th part of an inch in diameter: the serrations are distinct and nearly at right angles. Viewed as an opaque object, it has a beautiful appearance, twenty or thirty little leaves or scales combining to form each cup.

In its native state, and with the great quantity of hair covering and diminishing the growth of the wool, the fleece of this sheep cannot be of much value for manufacturing purposes, but breeding would effect a great alteration. The hair could here, as on other sheep, be diminished—eradicated; the fineness of the fibre might be retained; the number of serrations increased, and the all-important spiral curve appended. Much of this has been done. The sheep now under consideration had spread from Wallachia through Hungary, Bohemia, and some other of the Austrian states. Its wool was not always shorn. Many of the lambs were killed, that fine cloaks, and other articles of clothing might be made of their skins with the wool on them. The skin of the adult sheep, with its wool on, was employed to make dresses for the peasantry. It was covered with oil or grease, and converted into a rude, but effectual mantle, clothed in which the shepherd or the woodman could brave any storm, and even sleep in the midst of snow. In many places these sheep have been shamefully neglected, and fed on the worst pastures; but since the introduction of the Merinos, much improvement has taken place in the fleece; and, what is of great importance, the old Wallachian sheep has disappeared over a great part of the country, and has been superseded by the Spanish one.

THE MOLDAVIAN SHEEP.

These differ from the Wallachians chiefly in the length of the tail, the form of the horn, which is not so decidedly spiral, and the quality of the fleece. They carry two distinct species of wool, or rather a coat of hair, and another of wool. The hair is coarse—coarser than that of the Wallachian, and is 11 inches long. The wool is from 3 to 7 inches in length—finer than the hair, but not so fine as that yielded by the Wallachian.

The *Moravian* sheep are larger; they have a small head,—a back somewhat bowed, and they carry long wool, finer than that yielded by the Wallachian or Moldavian*. The change effected in all of them by the introduction of the Merino will be considered hereafter.

M. Lasteyrie speaks in strong terms of the bad management of the sheep in those countries before the recent improvements commenced. He says that these animals, when protected at all, were housed in confined buildings, without apertures, and from which the dung was removed only twice in the year. This treatment, and bad food during winter, occasioned frequent diseases in the flocks and herds, so that there were few countries where the murrain was so frequent or so disastrous†. Arthur Young confirms this. He is speaking of the Bohemian sheep:—"Wool generally sells well, but the price does not induce the farmers to increase their flocks, owing to the severe losses they are liable to, through all the imperial hereditary countries; for 600 or 700 in a flock will die in one night. The nature of the distemper is not known, but it is attributed to the excessive heat of the sheep-houses in which the animals are lodged‡." The far greater value of the Merino sheep,

* Lasteyrie on the Merino Sheep, p. 194. † Ditto, p. 196.
‡ Annals of Agriculture, vol. vi. p. 170.

and the consequent improved system of sheep-husbandry, have now banished this pest from the whole of the Germanic states.

THE GREEK SHEEP.

The few fragments which related to the Grecian sheep were collected when the early history of this animal was considered. The present character and management of the sheep are in keeping with the oppressed and debased state of modern Greece. The Arcadian sheep seem to have retained most of their primitive excellence. They are 30 or 36 inches long, 16 or 18 high; weighing about 10 or 12 pounds the quarter; the head large, the countenance lively, the back broad, the chest round, the legs small, the wool thick, soft, and much curled *. This, with proper management, would seem to be a useful and profitable animal.

The flocks consist of about 500 sheep in each, under the care of three men and a boy. For the pasturage of each animal the owner pays one asper and a half † to the spahi of the village, who claims all the land as his property. Government demands another asper and a half per annum, and three aspers on each fleece. No provision is made for the food of the sheep during the winter, but they wander from one pasturage to another, according to the state of the season or the weather.

The profits of the flock are derived, firstly, from the lambs, which are contrived to be dropped near the coast in December, and among the hills in January. They are fed almost entirely on milk for two or three months; and at Easter, when there is a great consumption of lamb among the followers of the Greek church, they are worth from four to six piastres each ‡.

In March the ewes are separated from the lambs, and for the three following months are milked twice daily, then once a day for a month, and in July once in two or three days. A good ewe yields a pint of milk at each time. From this the Greeks ingeniously contrive to extract all the profit that it will yield. First, after having stood twenty-four hours in order to become sour, the milk is beaten in a narrow cask with a stick until the butter swims on the top. An equal quantity of fresh milk is then added to the buttermilk, and the manufacture of cheese commences. The first curd being removed, a tenth part of fresh milk is added to the whey; and, after a short boiling, a second coagulum is formed on the surface, termed *misithra*, and which is both palatable and nutritious. A superior variety of curd or cheese, and highly valued, is manufactured from the best new milk either of sheep or goats. A kind of rennet is prepared of the juice of a lemon mixed with flour and water that had been suffered to become sour, and then mixed with boiling milk. The new milk is boiled, and when it has cooled so as to bear a finger to be dipped into it, a small cupful of the rennet is poured into several quarts of the milk, and in three hours the curd is formed and fit for use.

The sheep-shearing season lasts from the middle of April to that of May. No washing or preparation is deemed necessary. The ewes yield three and the rams four pounds of wool, which sells for about ten paras § a pound. The greater part of this wool is exported, and the remainder is worked into coarse cloaks or carpeting. The skin, when sold unshorn, is worth from thirty to forty paras, and when converted into leather supplies most of the neighbouring islands.

* Agricult. Mag., April, 1802.
† An asper is about an eighth part of a penny.
‡ The piastre of 1816 is in value about 9¾*d*.
§ A para is three aspers, or three-eighths of a penny.

These sheep are subject to a pustular eruption (the *claveau* of the French), which destroys a great number of them. Inoculation with the matter of the pustule has been introduced with much success: a milder and more tractable disease is thus substituted. The rot is also very fatal in the Morea. Beef is little used for food in this part of Greece, but the mutton is much valued*. Only a very small number of sheep are found on any of the islands of the Greek Archipelago; but the inhabitants are principally dependent on Greece or Turkey for the supply of wool and hides, and mutton and beef.

THE CYPRUS SHEEP.

The fat-tailed sheep are found in considerable numbers in this island, large in size, and the tail frequently weighing more than 50 pounds. They are of various colours, the white being most esteemed. The greater part of the wool used to be exported to Leghorn and to the south of France, in order to be used in the coarser manufactures.

Many of these sheep are policerate (having more than two horns). They all spring from the frontal bones, the crest of which is elevated in a peculiar manner, in order to form their base. The central horns are usually straight, or somewhat divaricating—occasionally they are spiral; the lateral ones assume almost every possible variety of curve. The following cut represents the most frequent appearance of the Cyprus four-horned sheep. This



[*Cyprus, or four-horned Sheep.*]

* Leake's Travels in the Morea.

multiplicity of horns is not found in any breed intrinsically of much value. It is generally accompanied by great length and coarseness of the fleece, and which, in the majority of these cases, assumes more the form of hair than of wool*.

SICILIAN SHEEP.

An account, extracted from the earliest poet, has already been given of the supposed primitive management of the sheep in Sicily (pages 48, 49). A valuable breed of sheep is still found in this island, and, with regard to which, the same system of migration is pursued as in the Spanish flocks; but the wool is far inferior to that of the Merino. Livingston imagines that they are descendants from the stock of the ancient shepherds, and which had undergone all the improvement of which that race of animals was capable when Sicily was in its highest state of civilization†.

ITALIAN SHEEP.

When Rome was in the zenith of her glory, the sheep of Italy seemed to be worthy of the soil on which they fed. "The best wool, of all others," says Pliny, "is that of Apulia (on the south of Naples); then that which in Italy is called the Greek sheep's wool, but in other countries is named the Italian (still more to the south, being that part of Italy which was particularly colonised by the Greeks). The Milesian (Asiatic) sheep and wool carry the third prize. The wool of Apulia is of a very short staple, and especially in request for cloaks and mantles about Tarentum (Taranto) and Canusium (Canosa); and as for whiteness, there is none better than that which groweth along the Po and in Lombardy‡."

If we are to credit the accounts of ancient authors, the Italian sheep and the Italian wool were cultivated with a care and assiduity which leaves all the precautions of modern times far behind. The reason of this was plain. The clothing of the richest and most refined people then in the world was at first made of wool: but at length the silk and cotton of the East gradually introduced themselves into Europe, and the Italians found the fabrics composed of these materials to be better adapted to the heat of the climate in which they lived. The consequence was that sheep began to be cultivated more for the carcass and less for the fleece; and the breeds of Apulia and Tarentum were rapidly deteriorated, and at length disappeared, and were succeeded by a larger, coarser, and hardier, but, under the altered circumstances, more profitable race§.

When, after the middle ages of darkness were passing away, the arts and manufactures again revived, Italy took the lead in the production of the

* Mariti's Travels in Cyprus, vol. i., pp. 35, 225. Anderson on Sheep, p. 41.

† The argument by which he enforces this opinion is at least a very ingenious one. "Those," (the sheep of Sicily,) "with most of the sheep I have seen in Italy, have pendent ears. From this circumstance I presume that they have been longer domesticated than those of Spain or the other parts of Europe; and as this country was originally settled by the Grecians, it is highly probable that the present race is from the stock of the first colonists: for, extraordinary as it may appear, notwithstanding the various changes which that country has undergone, its agriculture seems at the present to be what the poets describe it to have been two thousand years ago, and the implements of husbandry dug up at Pompeii and Herculaneum are evidently the models of those now in use in the vicinity of Naples.

"I consider pendent ears as a proof of very ancient domesticity, because I believe all wild animals carry theirs erect; and most, if not all of them, have the power of moving them to the point from which the sound is derived. When they cease to be their own protectors, and rely upon man both for defence and support, the organs given them with a view to these objects are gradually impaired, and the debility which results from their inaction changes their very form."—Livingston on Sheep, p. 44.

‡ Plin. Secund., lib. viii., cap. 48. § Bath Papers, vol. ii., p. 216.

finest and most costly woollen fabrics; but she no longer worked on her own materials, for her sheep would no longer yield her the means of competing with, much less surpassing, other countries. She had then recourse to the wools of Spain: thus Damianus, speaking of the exportation of wool from Spain, says that "those used in Italy, being the choicest, were sold for from forty to fifty gold ducats per sack." It would even seem that not a particle of her own wool was enwoven or capable of being enwoven in the fabric, for Richelius, in his 'Political Testament,' printed in 1635, speaking of the woollen manufactures of France, says that "they were preferred to those of all other countries except Venice, where they were made of Spanish wool*."

An extract from a modern work will show the altered and debased character of the Italian sheep previous to the introduction of the Merinos, of which mention will be presently made. "The sheep in the hill country near Rome are handsome, but of that kind whose fleece grows only on the back and half way down the sides. Black sheep are rather encouraged here for their wool, and the clothing of the friars is of this undyed wool. The clothing of the galley-slaves, which is partly worn without dyeing, is of a dark brown and white stripe. A kind of hard sourish cheese is made from the milk of the sheep, and they are profitable for the market, as they fatten easily. *The goats, however, are the most useful domestic animals* †."

Although the old Tarentine sheep produced a wool unequalled in early times, they were not without their defects, and very serious ones too. They were called by the agriculturists of those days *pellitæ* and *tectæ*, from the skins and other clothing with which they were covered; and also *molles*, not only from the softness of their fleece, but from the delicacy of their constitution, and the constant care that was required in order to preserve them from injurious vicissitudes of heat and cold. They are described as a most voracious breed; and any considerable or long-continued diminution of their food was attended with certain destruction of the flock. As there was no sale for the lambs, nor any profit from the milk, half of the young ones were destroyed at their birth, and each of the remaining ones suckled by two ewes—a sufficient proof that, like their probable descendants the Merinos, they were bad nurses. The ram-lambs were chiefly reared, and were castrated and killed at two years old, when, by means of constant clothing and compression, like the black lambs of Bucharia (see p. 53), an undulating gloss was given to the fleece, and it was sold at an advanced price. Notwithstanding this however, they are uniformly described as an unprofitable breed, for their carcasses were comparatively of little value, and they could not endure want or hardships, or the slightest neglect.

The preparation of this fleece was a work of great labour. It was frequently uncovered, not only to ascertain its condition, but for the refreshment of the animal; it was drawn out, and parted and combed, if it was beginning to mat; it was frequently moistened with the finest oil, and even with wine; it was well washed three or four times in the year; the sheep-houses were daily and almost hourly washed, and cleaned, and fumigated. The flocks were necessarily small, and the attendance and care expensive; and therefore it is not to be wondered at if, in the later periods of the Roman empire, and when the irruption of the barbarians commenced, they were gradually lost, or intermixed with the coarser-woolled native and uncultivated flocks of the country ‡.

* Encyclopædia Londinensis, Article Wool.

† Graham's Three Months in Rome, 1821.

‡ The reader may see this subject well treated in a very ingenious pamphlet, entitled "On the Name and Origin of the Breed of Merino Sheep," published in 1811.

THE PIEDMONTESE SHEEP.

Piedmont, and the country near the Alps, is celebrated by Pliny for its breed of grey fine-woolled sheep, and which vied with the choicest black wool of Spain, or white of Italy, or red of Asia*. These sheep never entirely degenerated; or rather, amidst the degeneracy of others, it was acknowledged that the wool of Piedmont and the Alpine region of Italy was excelled only by that of Spain†. The establishment of the Merino in Piedmont will be an interesting subject.

THE SAVOY SHEEP.

Few sheep are kept in the valleys of Savoy, as it is necessary to house them during the winter, and no better food can be obtained for them than the dried leaves of trees. Poor families keep a few sheep to supply them with wool. "These little flocks," says Bakewell, "are driven home every evening, generally accompanied by a goat or a cow, a pig or an ass, and followed by a young girl spinning with a distaff. As they wind down the lower slopes of the mountains, they form the most picturesque groups for the pencil of the painter, and carry back the imagination to the ages of pastoral simplicity sung by the poets‡."

SWISS SHEEP.

The Cantons of Switzerland produce various breeds of sheep, according to the mountainous character of the country and the richness of the pasture. In some of the valleys there are sheep not much unlike the long-woolled English breeds. They have been imported, or sheep to improve them have been procured, from Swabia, Flanders, and Great Britain. They average from 24 to 36 pounds the quarter when fatted. The rams yield from 10 to 14 pounds of wool in the grease, and the ewes from 6 to 8 pounds. This wool is somewhat, but not much inferior in quality to the Lincolnshire wool.

On the more irregular, yet not abrupt parts of the country, and where wheat and especially clover are grown, and particularly in the neighbourhood of Thun, a smaller breed of sheep is found. They produce a shorter wool, more adapted, at least according to the old system of manufacture, for the card than the comb. Those of a brown or black colour yield the finest wool.

Consistent, however, with the character of the country, the mountain sheep are the most numerous, and, on the whole, the most profitable. They are of a still smaller size, and they have much improved since the introduction of the Merinos into Switzerland; for their wool has not only increased in fineness, but it has doubled or tripled itself in weight. They are hardy, little susceptible of rot; they live and thrive longer than other breeds, and do not lose their teeth until they begin to get very old. They are from 20 to 24 inches in height, and from 3 feet 4 to 8 inches in the girth. They are shorter in the leg than mountain sheep are generally found to be, and will average, when fatted, from 20 to 24 pounds the quarter. The wool is fine, short, and proper for the card.

There are also several flocks of the pure Merinos, and of others between the Merinos and the native sheep, although the prejudice against this breed now happily overcome, was perhaps greater in Switzerland than in any other part of Europe§.

* Plin. Secund., lib. viii., ch. 38. † Lasteyrie on the Merino Sheep, p. 105.
‡ Bakewell's Residence in Tarantasia, vol. i., p. 327.
§ Lullin sur les Bêtes à Laine dans les Environs de Genève, 1807.

THE SPANISH SHEEP.

Before the sheep of the other European states are described, it will be proper to consider the Spanish sheep, the spread of which in different countries has, either directly or indirectly, effected a complete revolution in the character of the fleece.

The early writers on agriculture and the veterinary art describe various breeds of sheep as existing in Spain: they were of different colours—black, and red, and tawny. The black sheep yielded a fine fleece—the finest of that colour which was then known; but the red fleece of Bætica—Granada and Andalusia—was of still superior quality, and "had no fellow*."

These sheep were probably imported from Italy. They were the Tarentine breed, already described, and which had gradually spread from the coast of Syria and the Black Sea, and had now reached the western extremity of Europe. Many of them mingled with and improved the native breeds of Spain, while others continued to exist as a distinct race; and, meeting with a climate and a herbage suited to them, retained their original character and value, and were the progenitors of the Merinos of the present day. Columella, a colonist from Italy, and uncle to the writer of an excellent work on agriculture, resided in Bætica in the reign of the Emperor Claudius (A. D. 41). He introduced more of the Tarentine sheep into Spain, and he otherwise improved on the native breed; for, struck with the beauty of some African rams which were brought to Rome to be exhibited at the public games, he purchased them, and conveyed them to his farm in Spain. Hence, probably, the better varieties of the *Chunah*, or long-woolled breeds of Spain, that will presently come under consideration.

Previous, however, to the time of Columella, Spain possessed a valuable breed of sheep; for Strabo, who flourished under Tiberius, speaking of the beautiful woollen cloths that were worn by the Romans, says that the wool was brought from Truditania, in Spain†.

With regard to the extent of these improvements history is silent; but as Spain was at that time highly civilized, and as agriculture was the favourite pursuit of the greater part of the colonists that spread over the vast territory which then owned the Roman power, it is highly probable that the experiments of Columella laid the foundation for a general improvement in the Spanish sheep—an improvement which was not lost, nor even materially impaired, during the darker ages that succeeded‡.

* Plin. Sec., lib. viii., ch. 48. † Livingston's Essay on Sheep, p. 39.

‡ The following observations from an anonymous but valuable pamphlet, published in 1811, and entitled "On the Name and Origin of the Breed of Merino Sheep," will be interesting to many readers:—

"The original Spanish sheep were, according to Pliny, Solinus, and Columella, some black-fleeced; some produced red or Erythæan wool; and some, as those about Cordova, had a tawny fleece. The remains of these ancient varieties of colour may still be discerned in the modern Merino sheep. The plain and indeed the only reason that can be assigned for the union of black and grey faces with white bodies, in the same breed, is the frequent intermixture of black and white sheep, until the white prevails in the fleece, and the black is confined to the face and legs. It is still apt to break out occasionally in the individual, unless it is fixed and concentrated in the face and legs by repeated crosses and a careful selection; and, on the contrary, in the Merino South-down the black may be reduced by a few crosses to small spots about the legs, while the Merino hue o'erspreads the countenance. The Merino hue, so variously described as a velvet, a buff, a fawn, or a satin-coloured countenance, but in which a red tinge not unfrequently predominates, still indicates the original colours of the indigenous breeds of Spain; and the black wool, for which Spain was formerly so much distinguished, is still apt to break out occasionally in the legs and ears of the Merino race. In some flocks, half the ear is invariably brown, and a coarse black hair is often discernible in the finest pile. The Erythæan, the Fuscus, and perhaps the Pelligo of the ancient Spanish breeds, are pre-

In the eighth century the Saracens established themselves in Spain, and they found it fruitful in corn and pleasant in fruits, and "glutted with herds and flocks." The luxury of the Moorish sovereigns has been the theme of many a writer, and a rich and expensive dress has always been one of the leading articles of luxury: accordingly, in the thirteenth century, when the woollen manufacture was scarcely known in a great part of Europe, and in few places flourished, there were found in Seville no less than 16,000 looms. At the same period the cloths of Lerida were much esteemed. A century afterwards, Barcelona, and Perpignan, and Tortosa were celebrated for the fineness of their cloths, and the greater part of Europe, as well as the coast of Africa, was supplied with them; and, later than this, and in the time of Charles V., Spain was full of flocks and herds, and not only furnished its own people most abundantly, but also foreign nations, with the softest wool. In 1576 there were annually exported from Spain to Bruges alone 40,000 sacks of wool, each selling for at least 20 gold ducats (9*l.* 5*s.*); and others, of a finer kind, were sent to Italy at the price of 50 gold ducats (23*l.* 2*s.* 6*d.*) per sack*.

After the expulsion of the Saracens the woollen manufacture languished, and was in a manner lost, in Spain. Ferdinand V. banished nearly 100,000 industrious people because they were Moors; and for this worthy deed was honoured with the title of Catholic. His successor, Philip III., drove from Valentia more than 140,000 of the Mahometan inhabitants; and in the three following years 600,000 more were expelled from Murcia, Seville, and Granada. The majority of these people were artisans—weavers; and the natural consequence was that the 16,000 looms of Seville dwindled down to sixty, and the woollen manufacture almost ceased to have existence throughout Spain†.

The Spanish Government at length saw, but too late, its fatal error, and many attempts have been since fruitlessly made to produce again the beautiful fabrics of former days. All this while, however, the Spanish sheep seem to have withstood the baneful influence of almost total neglect. Until a few years ago, the Peninsula continued to possess the most valuable fine-woolled sheep; and will always have to boast that, although the Merino flocks and the Merino wool have improved under the more careful management of other countries, Europe and the world are originally indebted to Spain for the most valuable material in the manufacture of cloth.

It has already been mentioned (see p. 123) that Pedro IV. of Spain imported, for the supposed improvement of the Spanish sheep, several Barbary rams; and that, two hundred years afterwards, Cardinal Ximenes had recourse to African rams for the same purpose. Of the effect produced by these experiments there is no authentic account. It is probable that the Barbary sheep, like the Cotswolds of England, were employed in improving the coarser and long-woolled breed of Spanish sheep; and that the shorter and finer woolled sheep, the breed whence the present race of Merinos descended, were undebased by foreign admixture.

The perpetuation of the Merino sheep in all its purity, amidst the convulsions which changed the whole political existence of Spain, and de-

cisely the red or fawn, the buff or satin-coloured countenances of the Merinos at present; and whatever was the peculiar colour which the elder Columella introduced by means of African rams into his Tarentine flock, we may conclude that the same expedient was adopted by the agriculturists of Bætica to convert their coarse into fine-woolled breeds, and to communicate the purest white to the party-coloured fleece."

* Livingston, p. 41. See also an excellent and most satisfactory article on the Spanish Wool in the Encyclopædia Londinensis, vol. xxiv.

† See a very valuable pamphlet on the Woollen Manufacture, and not half so much known as it deserves, by Mr. Wansey.

stroyed every other national improvement, is a fact which the philosopher and the philanthropist may not be able fully to explain; but which he will contemplate with deep interest. In the mind of the agriculturist, it will beautifully illustrate the primary determining power of blood or breeding, and also the agency of soil and climate, a little too much underrated, perhaps, in modern times.

The Spanish sheep are divided into the *estantes* or *stationary*, and the *transhumantes** or *migratory*. The stationary sheep are those that remain during the whole of the year on a certain farm, or in a certain district, there being a sufficient provision for them in winter and in summer. The transhumantes wander some hundred miles, twice in the year, in search of pasture.

The *stationary* sheep consist of two breeds essentially different, and a third or intermediate one. The first is the *Chunah* breed: it is altogether distinct from the Merinos, being larger, taller, and heavier, with the head smaller and devoid of wool. The staple of this wool is eight inches long; it is much coarser than that of the Merino, and almost devoid of curve, and consequently of inferior value. This breed extends through almost the whole of Spain. It is the breed of the peasant and the little proprietor; and it is numerous even in those provinces where the Merinos are most extensively cultivated and most perfect.

It was probably in order to improve this coarser long-woolled breed that certain sheep were in the fifteenth century exported from England to Spain. There has been controversy whether they were Ryelands or Cotswolds; but Stow and Baker have, in their Chronicles, completely settled the question. The former says, "This yere (1464) King Edward IV. gave a licence to pass over certain *Cotteswolde* sheep into Spain." Baker adds, "King Edward IV. enters into a league with John, king of Arragon, to whom he sent a score of *Costal* ewes and four rams—a small present in show, but great in the event, for it proved of more benefit to Spain, and more detrimental to England, than could at first have been imagined." The fleece of the Cotswolds is fine, but the staple is long; and crosses with such sheep could only benefit a long-woolled flock. The Chunahs, therefore, may be descendants of the English sheep mixed with the common breed of the country; but further than this, England cannot, with any degree of justice, urge the claim which some have done, of being instrumental in producing the invaluable Spanish wool.

In the same way the known importation of English long wool into Spain may be accounted for. It was mixed with the coarser long wool of that country; it was that by means of which a greater quantity of the Spanish long wool could be used in the manufacture of certain articles, and particularly of the finer serges; and perhaps it may be said, by means of which it could be used at all except in the coarsest fabrics. It was in the Spanish worsted manufactures what the Spanish or German wools are to the English ones in the manufacture of cloth: they permit the use of a greater quantity of British growth, and materially improve the fabric in the construction of which they are employed.

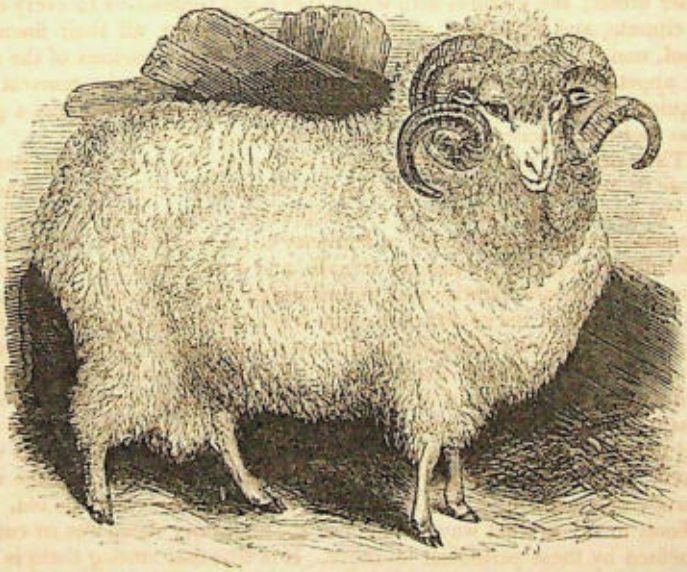
The other principal breed of *stationary* sheep consists of true Merinos. They wander not from the district or the property on which they are bred. In form and in fleece they differ not from the migratory sheep. They are found chiefly on the pastures scattered among the Guadarrama mountains, the Somo Sierra ranges, and the whole country of Segovia. They amount to about two millions.

Beside these, and also stationary, and found in every part of Spain,

* From *trans* and *humus*, expressive of their change of climate and pasture.

are various mixed breeds, the produce of the Merinos and the Chunahs, and other native varieties of sheep. Their character and value differ according to the proportion of Merino blood in them; and where that considerably preponderates, they are often confounded with and substituted for the pure Merinos. The Chunahs and the mixed breeds amount to six millions.

The description of sheep most sought after, and by which so many countries have been enriched, is the *transhumantes*, or *migratory* ones—those which pass the summer in the mountains of the north, and the winter on the plains towards the south of Spain.



[*Merino Ram.*]

The first impression made by the Merino sheep on one unacquainted with its value would be unfavourable. The wool lying closer and thicker over the body than in most other breeds of sheep, and being abundant in yolk, is covered with a dirty crust, often full of cracks. The legs are long, yet small in the bone; the breast and the back are narrow, and the sides somewhat flat; the fore-shoulders and bosoms are heavy, and too much of their weight is carried on the coarser parts. The horns of the male are comparatively large, curved, and with more or less of a spiral form; the head is large, but the forehead rather low. A few of the females are horned, but, generally speaking, they are without horns. Both male and female have a peculiar coarse and unsightly growth of hair on the forehead and cheeks, which the careful sheepmaster cuts away before the shearing-time; the other part of the face has a pleasing and characteristic velvet appearance. Under the throat there is a singular looseness of skin, which gives them a remarkable appearance of throatiness, or hollowness in the neck*. The pile, when pressed upon, is hard and unyielding; it is so from

* Lord Somerville has some singular observations on this:—"The second property to be noted in this sheep is a tendency to throatiness, a pendulous skin under the throat, which is generally deemed a bad property in this country, and the very reverse in Spain, where it is much esteemed, because it is supposed to denote a tendency both to wool and

the thickness with which it grows on the pelt, and the abundance of the yolk, detaining all the dirt and gravel which falls upon it: but, when examined, the fibre exceeds in fineness, and in the number of serrations and curves, that which any other sheep in the world produces. The average weight of the fleece in Spain is eight pounds from the ram, and five from the ewe. The staple differs in length in different provinces. When fatted, these sheep will weigh from twelve to sixteen pounds per quarter.

The excellency of the Merinos consists in the unexampled fineness and felting property of their wool, and in the weight of it yielded by each individual sheep; the closeness of that wool, and the luxuriance of the yolk, which enables them to support extremes of cold and wet quite as well as any other breed; the easiness with which they adapt themselves to every change of climate, and thrive and retain, with common care, all their fineness of wool, under a burning tropical sun, and in the frozen regions of the north; an appetite which renders them apparently satisfied with the coarsest food; a quietness and patience into whatever pasture they are turned, and a gentleness and tractableness not excelled in any other breed.

Their defects, partly attributable to the breed, but more to the improper mode of treatment to which they are occasionally subjected, are, their unthrifty and unprofitable form; a voraciousness of appetite which yields no adequate return of condition; a tendency to abortion or to barrenness; a difficulty of yeaning; a paucity of milk, and a too frequent neglect of their young. They are likewise said, notwithstanding the fineness of their wool and the beautiful red colour of the skin when the fleece is parted, to be more subject to cutaneous affections than most other breeds. Man, however, has far more to do with this than Nature. Everything was sacrificed in Spain to fineness and quantity of wool. These were supposed to be connected with equality of temperature, or at least with freedom from exposure to cold; and therefore twice in the year a journey of four hundred miles was undertaken, at the rate of eighty or a hundred miles per week, and the spring journey commencing when the lambs were scarcely four months old. It is difficult to say in what way the wool of the migratory sheep was or could be benefited by these periodical journeys. It is true that among them is found the finest and the most valuable wool in Spain. The Leonese fleece will at all times sell for considerably more per pound than that of any other Spanish sheep; but on the other hand, the estantes of Segovia are more valuable than the transhumantes of Soria. Sir Joseph Banks goes farther, for he says that "Burgoyne tells us that there are stationary flocks both in Leon and Estremadura, which produce wool quite as good as that of the transhumantes*." In addition to this is the now acknowledged fact that the fleece of some of the German Merinos, who travel not at all, and are housed all the winter, as much exceeds that obtained from the Leonese sheep in fineness and felting property, as the Leonese fleece exceeds the Sorian; and the wool of the migratory sheep is comparatively driven out of the market by that from sheep which never travel†. At all events the

to a heavy fleece." In every breed in this kingdom which has come under the author's observation he has invariably found the throaty sheep not good in their skins, and with no aptitude to fatten, with the exception perhaps of the Ryelands. — Somerville on Sheep, p. 16.

* Communications to the Board of Agriculture, vol. vi. p. 2.

† Professor M'Culloch gives the following scale of the prices of wool in the London markets, March, 1834:—

		s.	d.		s.	d.
Spanish: —						
Leonessa	Per lb.	2	6	to	4	0
Segovia		2	6	—	3	6
Soria		2	6	—	3	0
Caceres						

advantages derived from the *Mesta* are overrated so far as the fleece is concerned; while with respect to the carcass, by these harassing journeys, occupying one quarter of the year, the possibility of fattening and the tendency to fatten must be destroyed, and the form and the constitution of the flock generally deteriorated, and the lives of many sacrificed.

The migratory sheep may be divided into two classes, or immense flocks—the Leonese and the Sorians. The Leonese, among which are the Negrettes, after having been cantoned during the winter on the north bank of the Guadiana, in Estremadura, begin their march about the 15th of April in divisions of two or three thousands. They pass the Tagus at Almares, and direct their course towards Trecasas, Alfaro, and L'Epinar, where they are shorn. This operation having been performed, they recommence their travels towards the kingdom of Leon. Some halt on the Sierra (ridge of mountains) which separates Old from New Castile, but others pursue their route to the pastures of Cervera, near Aquilar del Campo. Here they graze until the end of September, when they commence their return to Estremadura.

The Sorian sheep, having passed the winter on the confines of Estremadura, Andalusia, and New Castile, begin their route about the same time. They pass the Tagus at Talavera, and approach Madrid; thence they proceed to Soria, where a portion of them are distributed over the neighbouring mountains, while the others cross the Ebro in order to proceed to Navarre and the Pyrenees*.

	Per lb.	s.	d.		s.	d.
Caceres		2	9	—	3	6
Seville		2	0	—	2	9
Portugal		1	7	—	2	0
Lambs' Wool		1	9	—	1	10½
GERMAN, SAXON AND SILESIAN:—						
1st and 2nd elect		4	9	—	5	3
Prima		4	0	—	5	0
Secunda		3	0	—	3	6
Tertia		2	2	—	2	6
AUSTRIAN, BOHEMIAN, AND HUNGARIAN:—						
Electoral		4	0	—	5	6
Prima		3	6	—	4	6
Secunda		2	6	—	3	6
Tertia		2	0	—	3	0
Lambs		2	9	—	4	6
Pieces		2	6	—	4	0
Fribs		1	9	—	2	9
AUSTRALIAN:—						
Best flocks, superior fleeces		3	6	—	4	6
Seconds		2	9	—	3	10
Inferior flocks		2	3	—	2	9
VAN DIEMAN'S LAND:—						
Inferior		1	0	—	1	9
Middling		1	10	—	2	1
Combing		0	0	—	0	0
Superior		2	6	—	2	11
Cape		1	0	—	1	11
BRITISH FLEECES:—						
North and South Down Hoggets		2	0	—	2	2
Half bred ditto		2	0	—	2	2
Ditto, ewes' clothing		1	10	—	2	0
Kent fleeces		2	1	—	0	0
Combing skins		1	8	—	1	10
Ditto, flannel wool		1	8	—	1	10
Ditto, blanket ditto		1	3	—	1	6
Leicester fleeces		1	6	—	2	0
In Yolk Devons		0	10	—	0	0
Ditto, Down		1	0	—	0	0
Ditto, Merino		1	0	—	1	4
Goats' wool, Turkey		1	6	—	1	6½

* Tessier, Inst. des Bêtes à Laine. Dillon's Travels in Spain in 1779.

These periodical journeys can be traced back to the middle of the fourteenth century, when a tribunal was established for their regulation. It was called the *Mesta* (the derivation of this term is disputed), and consisted then, and continues to consist, of the chief proprietors of these migratory flocks. It established a right to graze on all the open and common land that lay in the way; it claimed also a path ninety yards wide through all the enclosed and cultivated country; and it prohibited all persons, even foot passengers, from travelling on these roads while the sheep were in motion.

The number of migratory sheep is calculated at ten millions. They are divided into flocks, each of which is placed under the care of a *mayoral*, or chief shepherd, who has a sufficient number of others under his command, with their dogs*. He uniformly precedes the flock, and directs the length and speed of the journey; the others with the dogs follow, and flank the cavalcade, collect the stragglers, and keep off the wolves, who regularly follow at a distance and migrate with the flock. A few asses or mules accompany the procession, in order to carry the little clothing and other necessaries of the shepherds, and the materials for the fold at night. Several of the sheep, principally wethers, are perfectly tamed, and taught to obey the signals of the shepherds. These follow the leading shepherd, having been accustomed to be fed from his hand; they lead the flock—there is no driving—and the rest quietly follow.

When passing through the enclosures, they sometimes travel eighteen or twenty miles a day; but when they reach an open country, with good pasture, they proceed more leisurely. Their whole journey is usually more than four hundred miles, which they accomplish in six weeks, and thus spend, in going and returning, nearly one quarter of the year in this injurious manner.

It may be readily supposed that much damage is done, carelessly, or unintentionally, or wilfully, to the country over which these immense flocks are passing; and particularly as the migrations take place at the times of the year when the property of the agriculturist is most liable to injury. In the spring the corn has attained considerable height, and in the autumn the vines are laden with grapes. The commons also are so completely eaten down by the immense number of migratory sheep, that those which belong to the neighbourhood are, for a period, half starved. In addition to this, the servants of the Mesta, like the servants of Government elsewhere, have little common feeling with the inhabitants of the country which they are traversing; they commit much serious and wanton injury, and they refuse all redress.

The shepherds and the sheep equally know when the procession has arrived at the point of its destination. It is necessary to exert great vigilance over the flock during the last three or four days, for the animals are eager to start

* "The Spanish sheep-dogs are used entirely for the defence of the flock against the wolves, and in case of attack the sheep fly to, and gather round them as their friends and protectors. They are also taught, if a sheep lags behind unobserved by the shepherds, to stay with it and defend it until some one returns in search of it. If the shepherd wishes to remove the flock, he calls to him a tame wether, accustomed to feed from his hands, of which a few are kept in every flock; and these, however distant, obey the call, and the rest follow. With us, dogs are too often used for other and worse purposes. In open, unenclosed districts, they are indispensable, but in others, I wish them, I confess, either better managed, or encouraged less. If a sheep commits a fault in the sight of an intemperate shepherd, or accidentally offends him, he is *dogged* into obedience. The signal is given—the dog obeys the mandate, and the poor sheep flies round the field to escape from the fangs of him who should be its protector, until it becomes half dead with fright and exhaustion, while the trembling flock crowd together, dreading the same fate; and the churl exults in this cowardly victory over a weak and defenceless animal."—Trimmer on the Merinos, p. 50.

away, and often great numbers of them make their escape. If they are not destroyed by the wolves, there is no other danger, however, of losing them; for they are found on their old pasture, quietly waiting the arrival of their companions, and it would be difficult to make any of them proceed a great way beyond this spot. Even the stray sheep are generally found on the particular unfenced portion of ground, called a *dehesa*, which is allotted for the flock to which they belong *. The shepherds are immediately employed in constructing pens for the protection of the sheep during the night, and which are composed of ropes made by twisting certain rushes together which grow plentifully there, and attaching them to stakes driven into the ground. They next build, with the branches of trees roughly hewn, rude huts for themselves.

When the sheep arrive at their summer pasture, which at first is very luxuriant, the *mayoral* endeavours to guard against the possible ill effect of the change from the uncertain and scanty pasturage found on the journey, by giving the flock a considerable quantity of salt. He places a great many flat stones five or six feet from each other, and strews salt upon them; he then leads his flock slowly through the avenue of stones, and they devour the salt with great avidity. This is repeated on several successive days; and a case of general inflammation, or of hoove—the penalty too often paid by shepherds elsewhere for turning their flock unprepared on new and rich herbage—seldom occurs among the Spanish sheep.

During the summer pasturage the labour of the shepherd is light. The ewes are put to the rams early in August. After their return at the close of autumn, and when yeaning-time approaches, the barren ewes are separated from the others and placed on the poorest pasture. The Merinos are not good nurses, and nearly half of the lambs—or in bad seasons, and when the pasture fails, full three-fourths—are destroyed as soon as they are yeaned. The males are always sacrificed first: the others are usually suckled by two ewes—for it is a common opinion in Spain that the mother that fully suckles her lamb would yield less wool: they are afterwards placed on the best pasture, in order that they may acquire sufficient strength for their approaching journey. The number of lambs slaughtered is sometimes so great that they are sold to the neighbouring villagers for less than half a franc each. Most of the skins are sent into Portugal, and thence find their way to England, where they are used for the manufacture of gloves. Morning gowns, both light and of good appearance, are frequently made from the skins. The wool is soft and silky, and is formed into little rings or curls.

Few of the male lambs are castrated, because it is believed that the weight of the fleece is much increased on the ram, without acquiring proportional coarseness. The shepherd, however, early in March, has four operations to perform on the lambs: he cuts off their tails five inches below the rump,

* The country in which the sheep are to be pastured, both in the southern and northern parts, is set out into divisions, separated from each other by landmarks only. Each division is supposed to be capable of maintaining a flock of a thousand sheep. To each division the different flocks are rigorously confined.

This accounts for a peculiarity observed in the imported Merinos, in Britain, and in the Anglo-Merinos also. A writer in the Farmer's Magazine, November. 1826, says of them:—"They range all in one lot, that is, of whatever number the flock consists, it is found all in one place, feeding like a drove passing through a country. They are either on one of the spots of fine grass, or travelling from one to another. Nothing will induce them to do what the shepherds call 'lying abroad' upon the waste, or mingle with sheep of any other kind. After taking their walk every day over their range of pasture, they form a sort of camp at night, on the highest part of their ground, and may be certainly found there at day-break next morning, lying so closely, that they touch each other; the stronger sheep outside, and the weakest in the centre."

for the sake of cleanliness; he marks them on the nose with a hot iron; he cuts off the tips of their horns that they may not hurt each other in their frolics*, and he castrates those which, from their superior strength, and superior size, he has selected to become bell-wethers, and lead the flock in their peregrinations. This last operation is performed according to the French method, by squeezing the scrotum, and twisting the spermatic vessels.

April having arrived, the sheep begin to exhibit great anxiety to set out on their periodical migration, and make every effort to escape. If their purpose is accomplished, they start away in the proper direction, but ere they have traversed the 400 miles they are generally the prey of the wolves†.

It is supposed that forty or fifty thousand men are employed in these peregrinations of the sheep. They are a singular race of men, enthusiastically attached to their profession, rarely quitting it, even for a more lucrative one, and rarely marrying. In the winter they live in the rude constructed huts already described,—but in the summer, or when they are on their travels, they sleep on the ground wrapped in their cloaks. Their chief food is bread, seasoned with oil or grease. Occasionally they eat their old sheep, or such as die of disease, but mutton is not their favourite food. The number of dogs kept for the purpose of guarding the sheep exceeds thirty thousand.

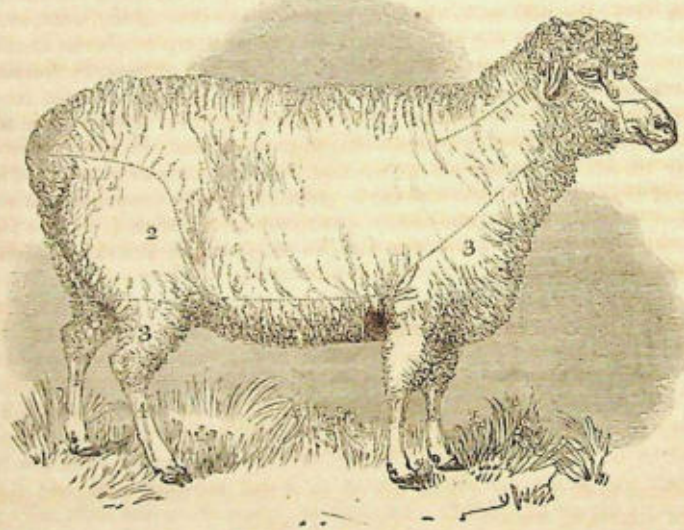
The shearing does not delay the flock more than a day. Buildings (*esquileos*) are erected at various places in the early portion of their journey; they are very simply constructed, and consist only of two large rooms, each of which will contain more than a thousand sheep; there is also a narrow, low, long hut adjoining, termed the *sweating-house*. The sheep are all driven into one of these apartments, and in the evening those intended to be shorn on the following day are transferred into the low long hut. As many are forced into it as it will possibly hold, and there they are left during the night. As some are liberated in the morning, the others are urged towards the end of the hut, while more from the apartment occupy their situation. In consequence of this close confinement they are thrown into a state of great perspiration; the yolk, which formed a somewhat hard crust on the fleece, is melted, and thus the whole is rendered softer, and is more easily cut. There is no previous washing, nor any other preparation for the shearing. From 150 to 200 shearers are generally collected at the esquileo, and a flock of a thousand sheep is disposed of in a day, although five rams or eight ewes are reckoned a good day's work for a Spanish shearer. The sheep are turned back as they are shorn into the second apartment, and on the same or the following day continue their journey; thus in the space of six days, as many flocks, each consisting of a thousand sheep, pass through the *esquileo*, and leave their

* The mode in which the Spanish shepherds cut off the horns is singular and brutal. It is not consistent with their usual kindness and gentleness to their flocks. "A ditch is made, which in length and breadth is about the size of a sheep, while in depth it is about five or six inches; and another is formed rather smaller than the former at one end of it, the two thus forming together a cross. In the last ditch, which is still more shallow than the other, a large plank is fixed to support the head of the ram when he lies on his back in the one which forms the trunk of the cross. A man stretches his body over that of the sheep, and holds the head forcibly upon the board with one hand, while with the other he holds a large chisel, weighing four or five pounds, which is then fixed upon the horn, and another man striking with a mallet, the part intended to be removed flies off at one or two blows."—Lasteyrie on Sheep, p. 226.—How much more simple would be the use of a fine saw!

† See Dillon's Travels in Spain. Livingston on Sheep, and Communications to the Board of Agriculture, vol. vi.

fleece behind them. The wool is then washed and sorted in the *esquileo*, and is ready for sale*.

The Merino fleece is in Spain sorted into four parcels. The following cut, while it contains the portrait of a Merino ewe, points out the parts whence the different wools are generally procured. The division cannot always be accurate, and especially in sheep of an inferior quality, but it is more to be depended upon in the Merino sheep wherever found, for the fleece is more equally good, and the quantity of really bad wool is very small.



[*Merino Ewe.*]

* The writer of an excellent article on wool very properly observes that "the management of the flocks is peculiarly Roman, and shows the Italian origin of these sheep. The Merino *mayoral* corresponds exactly with the *magister pecoris* of Varro and Columella, and was superior to the *opiliones* and *pastores*. The practice of destroying half the sheep at their birth, and of suckling each of the survivors on two ewes; of sweating the sheep before they were shorn, in order to increase the softness of the fleece, and of conducting them from their high winter to their summer stations, by long journeys through public sheep-walks, have been derived from Roman institutions; with this difference, that in Italy their migrations were confined to the coarse woolled sheep, while the molles oves, or fine woolled flocks of antiquity, were always housed."—Encyclop. Londinensis.

A condensation of Arthur Young's account of the Catalonian or Pyrenean breed will complete the account of the migratory sheep of Spain. The journeys of these sheep are smaller, and performed in a different manner. On the northern side of the Spanish portion of the Pyrenees are two mountains, the sides of which are covered with short, but plentiful herbage, and from one to the other of which the sheep are continually travelling during the summer. In the winter they are sent into the lower part of Catalonia, a journey of twelve or thirteen days, and when the snow begins to melt in the spring they are conducted back again to the mountains; thus they are kept the whole year in motion, they are never housed or under cover, and never taste of any food but what they find for themselves.

The author had the opportunity of examining a flock of these Catalonian sheep, consisting of about 2000. They were generally polled, but a few, both of the rams and ewes, had horns. The legs were white or reddish—the faces, some white, some red, and some speckled, and some with a tuft of wool on their faces; the carcass was round, the back straight; they were in good condition; would weigh, when fat, from 15 to 18 pounds per quarter, and resembled, on the whole, the South Down breeds.

Mr. Young wished to examine them more closely, and intimated this to the shepherd,

Both Lasteyrie and Livingston agree in this division*. The *refina*, (fig. 1.) or the picklock wool, begins at the withers, and extends along the back to the setting on of the tail. It reaches only a little way down at the quarters, but, dipping down at the flanks, takes in all the superior part of the chest, and the middle of the side of the neck to the angle of the lower jaw. The *fina*, (fig. 2.) a valuable wool, but not so deeply serrated, or possessing so many curves as the *refina*, occupies the belly, and the quarters and thighs, down to the stifle joint. The *terceira*, (fig. 3.) or wool of the third quality, is found on the head, the throat, the lower part of the neck, and the shoulders, terminating at the elbow: the wool yielded by the legs, and reaching from the stifle to a little below the hock, forms a part of the same division. A small quantity of very inferior wool is procured from the tuft that grows on the forehead and cheeks—from the tail, and from the legs below the hock. (fig. 4.)

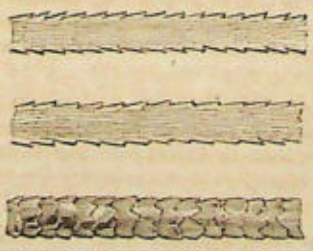
A cut was given of the Long Merino wool of Lord Weston, in page 88. The reader is now presented with one of the picklock wool, from a Merino of the Negretti breed; it was beautifully curved. Being viewed as a transparent object, the serrations are not so prominent as in the Long Merino, but they are more regular and more numerous; they are 64 in the 40th part of an inch, or 2560 in the space of an inch. It is likewise very fine, being only the $\frac{1}{1500}$th part of an inch in diameter.



[*Picklock Merino.*]

Considered as an opaque object, the edges of the cup have a very singular vandyked serration, resembling a pine or fir-apple.

The next cut gives the fibre of a fair sample of good Merino wool, probably the *fina*. The diameter of the fibre is the same—$\frac{1}{1500}$th of an inch,



[*Common Merino.*]

who immediately walked into the flock, and singled out a ram, and bid it to follow him, holding out his hand as if to give him something. The animal immediately came with the shepherd, and submitted itself to Mr. Young's inspection. He found that mellowness of the skin which is the surest proof of a good breed, and a tendency to fatten. The wool was beautifully soft and fine, and weighed, as he imagined, about eight pounds; the average weight of the fleece was usually about four or five pounds. Four shepherds, provided with fire-arms, and four or five large Spanish dogs, had the care of the flock. The sheep were collected together every night on a particular spot,—the shepherd slept in a little hut close by, and the dogs gave certain notice of the approach of danger. During the day the head shepherd sat on the mountain top, or on an elevated spot, whence he could see everywhere around him, while the flock browsed on the declivities.—Annals of Agriculture, vol. viii. p. 195.

* See Lasteyrie and Livingston on the Merino Sheep.

—but the serrations, when it is viewed as a transparent object, are but 60 in the 40th of an inch, or 2400 in an inch, being a sufficient difference to account for its diminished usefulness and price.

The central figure is a fibre of the same wool that has undergone the process of combing. The serrations are more irregular—they are partially, and some of them almost entirely, torn away. The felting property is evidently impaired, as the experience of the manufacturer shows it to be.

When viewed as an opaque object, the edge of the cups appears to be only lightly serrated, and although there are indications of the vandyked form of the picklock, the character is not so determined.

Lasteyrie, than whom there can be no better judge, thus describes the distinction between, and the comparative excellence of, the different flocks of Leonese Transhumantes.

The *Escurial* breed is supposed to possess the finest wool of all the migratory sheep. The *Guadeloupe* have the most perfect form, and are likewise celebrated for the quantity and quality of their wool. The *Paulars* bear much wool of a fine quality; but they have a more evident enlargement behind the ears, and a greater degree of *throatiness*, and their lambs have a coarse hairy appearance, which is succeeded by excellent wool. The lambs of the *Infantados* have the same hairy coat when young. The *Negretti* are the largest and strongest of all the Spanish travelling sheep*.

Mention has been made of the perfection of the cloth manufactures of Spain. It does not, however, clearly appear whether the cloths so celebrated were of a sergelike and open, or a close and felted structure,—whether they were made of a long or short wool—of the fleece of the Churrahs, or of the improved Merinos. Many circumstances would induce the suspicion that these goods were produced by the agency of the comb more than of the card; at least it is now notoriously the fact, that there is scarcely a manufactory of fine felted cloth that deserves consideration in the whole of Spain. In 1791, Thomas Bevian, of Melksham in Wiltshire, was engaged by the Spanish monarch, and established, at considerable expense, at Guadalajara, where there were previously considerable manufactories of serges, with a view of endeavouring to consume a portion of their own fine wool in their own country; but the scheme was soon dropped. Either the natural indolence of the Spaniards could not be sufficiently roused, or the minds of the people soon became exclusively occupied by political matters; or they thought, or, perhaps, found it more profitable to sell their fine wools to foreigners, than to fabricate them themselves. The woollen manufacture has to a considerable degree increased, but it has been the manufacture of serges, and even in them the Spaniards cannot compete with the Flemish or the English†.

When the Spanish fine wool first began to be so important an article of commerce is not known, but incidental mention is made of it as early as the 14th century. In the 15th century, it obtained a considerable price. A Spanish vessel bound for the Netherlands having been taken by an English privateer, the owners lodged a claim for damages, stating that the wool was worth 9*l.* 12*s.* per sack of 364 lbs., or about 6*d.* a pound‡.

The Spanish wool gradually became an important branch of English commerce. In the year 1800, three millions of pounds of Spanish fine wool were imported. This increased in 1810 to nearly 6 millions of pounds. In

* Lasteyrie on Sheep, p. 23.
† Wansey on Wool, p. 303.
‡ Anderson's History of Commerce, anno 1478.

1825 the importation exceeded 8 millions of pounds, but in 1832, when the Merinos had spread into Germany, and particularly into Saxony, and a wool, the staple of which was finer, and possessed more numerous curves and serrations, was produced there, the importation diminished to about two millions and a half *. A wool approximating in quality to the Spanish is now beginning to arrive from the British colonies, and its finest samples produce a higher price in the market than the Spanish.

Another reason, perhaps, of the diminished importation of Spanish wool is, that its average price is no longer what the Spanish breeder expects, or which he may fairly deem a remunerating one; and, therefore, he will not send so much of it as he used to do.

The Spanish wool, however, continues to be highly valued by the manufacturer; and the Spanish breed of sheep will be regarded with interest as the improver of the best old short-woolled ones, and the parent of a new race, spreading through every quarter of the world, and with which, so far as the fleece is concerned, none of the old breeds can be for a moment compared.

The progress of the Merino sheep through the various countries of Europe, and of every quarter of the world, may now be more satisfactorily and usefully traced. The principal authority for the statements that will be given is Mr. Lasteyrie, whose work abounds with useful information.

THE SWEDISH SHEEP.

The native sheep of Sweden are far from being a valuable breed. They are of moderate size, but the body is long and slender,—the legs also are long, and bare of wool,—the head small, the horns short, the fleece open, coarse in quality, and of a medium length; they are hardy in constitution —they care not for the rigour of the climate, and their flesh is good, although not overburdened with fat. It was evident that Sweden could support a better animal, for the herbage, although short, was thick and nutritive; and although the winter was often rigorous, the face of the country was such as to afford some shelter from the storm. Accordingly many attempts were made to improve the breed by means of foreign crosses. Recourse was had, and with considerable but variable success, to the German and Flemish sheep, and to the Leicester and Cheviots from Britain.

At length arose the wish to establish a fine woolled breed in Sweden, and it is singular that this northern country should be the first to import the sheep of the south, and to succeed to a very important extent in naturalizing them.

Mr. Alstroemer, in 1723, imported a small flock of Merinos. It was a hazardous—it appeared to be a presumptuous, an almost insane attempt; and this spirited individual had to struggle with seemingly insuperable obstacles. He, however, succeeded in collecting his little stock of southern sheep, and in preserving them from all apparent deterioration.

The Swedish government was wise;—in 1739 it established an agricultural school—it placed Mr. Alstroemer at the head of it—it offered premiums to the breeders of Spanish sheep, and premiums on the sale of the best wool. The plan succeeded: the importation of foreign fine wools diminished, and the growth of native wool began to exceed in quantity that which was imported. The manufacture of fine cloths increased, and yet the importation of fine wool was lessened. It did not quite cease because some of the German wools, grown at no great distance, could be purchased at

* See Mr. Hubbard's valuable table, p. 101 of the present work.

little price. The Merinos did not supersede the native breed, because the growth of long wool was indispensable for the clothing of the peasantry; and every flock did not prosper, because the Merinos, like other sheep require more attention, both in the breeding and the management, than the Swedish boor was willing to bestow, in order to preserve them in full perfection.

In 1764 there were in Sweden 65,000 sheep of the pure Merino blood, and 23,000 of a breed between the Merinos and the natives, and which bear an improved sort of wool. They gradually increased, and are now supposed to amount to a hundred thousand, or one twenty-fifth part of the whole number of sheep in Sweden.

In general they preserve their original form, and their original fleece; and although they have somewhat increased in size and hardihood, their wool has lost none of its softness or fineness. M. Lasteyrie states that he had the opportunity of comparing a flock of Merinos, established fifty-five years at Upland, with another that had just arrived, and he found that the wool of the old stagers was fully as good as that of the newly imported sheep.

The management of the Merino sheep in Sweden by intelligent agriculturists is suitable to the character of the sheep and the nature of the climate. The system of migration is completely abandoned. Both the native and imported sheep, after having been pastured during the day, are usually housed in the night at all seasons, on account of the great number of wolves. The peasantry and small farmers have these houses too confined and crowded; the better sheep-master has them large and well ventilated. The native Swedish flocks are kept in these buildings when the weather is unusually severe; the Merinos are housed during the six winter months; but the most scrupulous attention is paid to the cleanliness of the place, and scarcely any inclemency of weather will prevent the whole flock being driven out daily, at least for a few minutes, in order to breathe the fresh air while the sheep-house is cleaned. The Merino sheep are seldom used for breeding until they are two and a half years old, and are fattened for the butcher at seven. Great quantities of cheese are made from the milk of the native breeds—but the milk of the Merino is left for the nourishment of the lamb. The flocks are shorn in July—the fleece having been washed two or three days before the shearing.

THE FRENCH SHEEP.

The breeds of sheep in France are as various as the face of the country and the nature of the pasture of that extensive kingdom; but there are not many of them, except towards the very south of the country, that yield a fleece possessing much intrinsic excellence either for the purposes of the comb or the card.

When the British traveller lands in *Picardy*, and particularly in the neighbourhood of Boulogne, he thinks that he recognizes, in the hornless white faces and general form and appearance of the sheep, those of his native country. He is not altogether mistaken, for he finds a cross between the Romney-marsh sheep, which he has just left, and the sheep of Flanders, on the borders of which he then stands. The wool, however, is shorter and coarser, and more elastic than he has seen it in Kent, and not adapted for the better kind of fabrics. These are, altogether, the largest and finest sheep in France; and in some parts, and especially in the neighbourhood of Beauvais, he will see many to whom the Kentish sheep have imparted the propensity to fatten, which they derived from the Leicesters. The fleece also will probably weigh from six to eight pounds. At Abbeville was a

celebrated manufactory of fine cloth; but the neighbouring country yielded little of the wool employed.

Skirting the western coast he enters *Normandy*, in some parts of which he meets with a large breed of sheep—large for France—and weighing fifteen or sixteen pounds the quarter; but the Norman sheep do not in general average more than fifty pounds the carcass. At Colentin and at Valognes, in the peninsula which terminates in Cherbourg and Cape La Hogue, he finds some exceedingly good long-woolled sheep, and the fleece of which is employed in the lightest and best stuffs. The serge manufactory at Valognes is deservedly celebrated. These sheep form a pleasing contrast with others that he has met with between Rouen and Caen. Most of the Norman sheep are easily recognized by their red legs and faces. Some of the best and the worst mutton that France produces are found in Normandy, namely, at Colentin and Faux.

Still proceeding southward he begins more to recognize the true character of the French sheep, and in *La Maine*, and about Mayenne and Segre, he sees the long leg and thin carcase and coarse fleece of the Gallic long-woolled breed; and he fancies that he perceives more of the dry and insipid taste of the French mutton. In some parts of La Maine, however, the pure Flanders sheep are found; and others that bear comparatively fine wool. Many sheep are likewise fatted here for the Paris market; they are known by the name of the Alençons, the principal markets and fairs for them being in the neighbourhood of Alençon.

As he proceeds along the coast through *Bretagne*, *Poitou*, *Guienne*, and *Gascony*, he will find the character of the sheep essentially changed. He will begin to recognize the smaller short-woolled breed of various qualities, and some of them exceedingly valuable. Many of the true Flanders breed will linger about Poitou preparing for the Paris market: but the short-woolled breed will rapidly increase, and, in many places, occupy the whole of the country. In *Navarre* and *Bearn* he will recognize the neglected sheep of the mountains, with short and fine wool too much mixed and overrun by a coarser species of wool, as the native shepherds say, but, in point of fact, by real kemps. The fleece of a Navarre sheep will sometimes weigh eight or ten pounds; but it is often mostly composed of that which is comparatively valueless.

At the Lower or *Basses Pyrenees* the fleece weighs from three to five pounds, the wool is six or seven inches long, and tolerably fine. From the latter end of November until the spring, these sheep are kept in close houses; but no sooner does the snow begin to melt, and the grass to shoot, than the wethers, the ewes, and the yearlings, are turned out on the mountains. The lambs are kept back for a few weeks in order that they may forget their dams; and then all graze together on the short grass, which is so abundant that they have not occasion to wander far for an ample supply. In the evening the flock is collected into an uncovered fold near to a rude hut, built for the habitation of the shepherds. Little attention is paid to them in the day, and none at night, except the shepherd is roused from his slumbers by the barking of a Pyrenean dog, to whom the charge had been assigned of giving notice of the approach of the wolves or the bears. These sheep, when fat, weigh from ten to fourteen pounds the quarter. The wool generally has a peculiarity of colour: it is beautifully white towards the roots, and becomes of a fawn or red colour towards the extremity of the fibre.

In the central, or High Pyrenees, a different sheep is found. It bears considerable resemblance to the English Norfolks, having their horns and black faces and legs.

Still proceeding to the east, and entering Rousillon, a short and fine-

woolled sheep is found not unlike and scarcely inferior to the Merino. This breed is descended from the Merinos, a considerable depôt of which is established at Perpignan. The chief difference between the Rousillon and Merino sheep is that the wool does not grow so close; it does not present the same firm compact appearance, but hangs on the animal in separate and detached locks. The spiral structure, however, of these locks is beautiful; and the curves extend from the point to the root. The tint of the fleece is here more of a fawn or yellow colour, and the yolk is as abundant as in the Merino.

Pursuing the line of coast by Perpignan into Languedoc, the fine-woolled sheep continue to present themselves, and the fleece grown about Bezieres is highly esteemed. If there is an objection to these sheep, and one that increases when they are crossed with the Merino, it is that they do not fatten kindly. The fleece is susceptible of much improvement; the original coarse Bearn coat acquires considerable fineness and value; but the gaunt appearance and unthriftiness of the Merino is too much imparted.

Passing by the beautiful country of Montpelier and the mouths of the Rhone, the traveller can study the fine sheep and the sheep-husbandry of Arles. The district of the Crau, in length nearly eighteen miles, and about half as much in breadth, extends from the mountains towards the sea-coast. It is one uniform gentle declivity; in no part of it is there the slightest portion of stagnant water, and not a tree or a bush is to be seen. The soil is consequently dry, and apparently barren enough; but the herbage which it affords is that which peculiarly suits the sheep, and the cock's-foot grass, and the clover (*trifolium pratense*), and the common thyme, and the wild thyme, and the lavender (*lavandula spica*), grow amid the flints, affording a pasture nutritive, without one dangerous aqueous property, and of a luxuriance that would scarcely be deemed possible. No less than 130,000 sheep graze on this declivity.

A writer in the Memoirs of the Royal Academy of Sciences at Paris attributes the thriving of the sheep on such a spot to the free use of salt, thereby enabling the digestive organs to extract every particle of nutriment which the food contains. He says, "on this spot, so seemingly sterile, by the free use of salt, more numerous flocks of sheep are bred and reared than upon any other common of equal extent throughout the whole kingdom; and, what is not less remarkable, the sheep are healthier, hardier, and endure the severity of the winter with less loss, though they have fewer sheep-cots for covering, than those fed and bred on more copious pastures, and that have, besides, the advantage of more convenient shelter. It frequently happens that the Crau is so burnt up in the summer, that the poor animals," those at least that remain there, "are forced to turn up the very stones to come at the few blades of grass which grow around them, and yet none perish for want of food." Much advantage is doubtless derived from the salt; but the pasture is not quite so bare as this writer represents, and it is of that kind on which sheep everywhere flourish*. To this may be added, that the sheep on the Crau are, like those of the district next to be described, in a great measure *transhumantes*.

The Camarque, and Le Plain du Bourg, are two other districts of Arles abounding in sheep. They produce nearly the same herbage, with the exception of some of the aromatics; but instead of these there are the shrubby saltwort, the glass-wort, and the small shrubby orache—saline plants which always contribute to the health of the flock. About 112,000 sheep are pastured during the winter in these districts. They are a

* Quarterly Journ. of Agricul. vol. ii. p. 591. Annales de l'Agricult. Franç. 3e ser. tom. xiii. f. 219.

little larger than those of the Crau, but the wool is very nearly as fine. The superiority of the Crau wool has been accounted for in a singular yet not improbable manner. By reason of the numerous loose stones on the plain of Crau, the teeth of the sheep are frequently broken to so great an extent that the animals are usually slaughtered at or before five years old, and there is no defective wool from old worn-out sheep, but the produce of the adult and healthy alone is brought to the market.

All these sheep are migratory. In the spring of the year they are driven from the plains of Arles and the Delta of the Rhone towards the Alps, which divide Provence and Dauphiné from Italy. They mostly direct their course towards the hills in the neighbourhood of Barcelonette and Gap. The migration commences in May, and the sheep return to their winter quarters in November. These sheep are the property of the agriculturists of Arles and the neighbouring districts; and the migration is not only sanctioned by custom from time immemorial, but by particular laws which give them, and limit them to, a road thirty-six feet in breadth.

The flocks from the various districts of Arles, and the southern part of Provence, are collected together, and driven in troops of from 10 to 40,000 sheep. To every 1000 sheep three shepherds are allowed, each of whom has his dog, and in the centre of the flock is a troop of asses carrying the provisions and baggage. One shepherd is chosen by his fellows to direct the march, the expenses of which are defrayed from a common purse, of which he is the bearer. He travels in the centre, and thence transmits his orders, and issues the daily allowance of provisions, and listens to and determines on the complaints of the farmers in the neighbourhood of the road if any damage has been accidentally or wilfully done, and punishes the shepherds for any offence committed.

The sheep are led by goats which are trained for the purpose, and have bells around their necks. The discipline in which these animals are kept, and the intelligence which they display, is very great. They halt or proceed at the direction of the shepherd; they come to the centre at the close of each day's march, and there wait in the morning for the proper order, when they repair to their station at the head of the troop with the greatest regularity. If they come to a stream they halt until the word of command is given; and then they plunge immediately into the water, and are followed by the rest of the flock. The journey usually lasts from twenty to thirty days. When they arrive at the mountains each shepherd has his appointed boundary marked out; and the proprietors of the land are usually paid about twenty sous per sheep for their pasture during the summer. The shepherds sleep with their flock in the open air, and live almost entirely on bread and goat's milk *.

The question of the influence of these peregrinations on the fleece has been already considered. They occupy little more than half the time consumed by the Spanish sheep, and much of the objection to the system is therefore removed; but the fact is, (whether to be accounted for on the ground of prejudice, or the actually increased value of the sheep,) that the wool of the transhumantes sheep always sells for a greater price than that of the estantes. To this should be added the improvement of the sheep in the neighbourhood of these periodical resting places. The flocks of Gap and Barcelonette are much more highly esteemed than those only of a few leagues farther to the north, because they descended originally from the sheep of Arles, and are recruited every year by the migratory troops from that district.

* Annales de l'Agric. Fran., ibid. f. 220. See also the Encyclopædia Londinensis, article, Wool.

The reader must now be supposed to return very rapidly through the central districts of France. The fine-woolled breeds of the southern provinces have their influence on the sheep for a considerable distance northward; and almost the whole of the wool is in much repute. In Dauphiné it is yet finer than in most of the central southern provinces. The effect of a cross with the Merinos is sufficiently evident, but, at length, the breed of sheep, cultivated principally or almost entirely for wool, then begins to disappear, and a larger, coarser, but, on the whole, not less profitable animal is substituted. Both breeds are found in Burgundy. In Auvergne is a mountain breed, with black and white heads, and little esteemed. In Berri there is a considerable portion of fine wool, but many of the sheep are fattened for the Paris market, and the wool is consequently deteriorated. In Champagne the wool, although long, is tolerably fine, until the traveller arrives at the neighbourhood of Rheims and the commencement of the forest of Ardennes, where the sheep are small and the fleece coarse. Lorraine is almost exclusively a grazing country, the principal part of the sheep being bought in Alsace, or in the German markets.

The number of sheep in the whole of France was calculated in 1825 to be more than thirty millions; but a considerable diminution has taken place since that period. The year 1829 was almost as destructive to the French sheep as to those in England. One proprietor at Arles lost four thousand during that winter. The division of property—the separation of a large farm among several proprietors—has tended still more to lessen the number of sheep. It is the occupier of an extensive demesne alone who is able to adopt that system of agriculture that will enable him to provide for a numerous flock. Supposing a farm to be shared among four proprietors, the aggregate of the sheep kept by the four will not usually exceed half the number which the former occupant had possessed. In some of the departments, where this division has been carried to a great extent, not one-fourth part of the sheep that grazed there before the Revolution are now kept. The change which has taken place in other departments is not so considerable, but it may be fairly concluded that the number of sheep has, with the last ten years, decreased at least one-sixth part. Paris consumes about 347,000 sheep and lambs annually, being but little more than $\frac{1}{7}$th part of the existing flock*.

A short account of the supply of the Paris market will give the reader a sufficient idea of the grazing districts in the central and northern parts of France; the south is more devoted to the growth of fine wool. The first sheep that arrive at Paris after the expiration of Lent are from Flanders and Artois, and they continue until the end of May. The principal supply is from Brabant in May and June. Sheep also come from Maine and La Perche, from the end of May to October. The Alençon sheep, and those from Bourbonnois and Poitou, occupy the market at the same time. Sheep in good condition arrive from Berri in June, and continue until the end of October; and from Hainault and Normandy in great numbers towards the end of July, and in decreasing numbers to the end of October. From the forest of Ardennes they are sent from July to December; from Touraine, Gravelines, Liege, Brabant, Compigne, and occasionally from Swabia, during the whole of the autumn, through the medium of a company established in Switzerland. The Beauceron sheep that have grazed in Brie, Hurepoix, and Beauce, principally furnish the capital with mutton from the

* It will hereafter appear that $\frac{1}{32}$ part of the existing flock is annually consumed in the British metropolis, but the far greater comparative population of London, and the different consumption of animal food by the inhabitants of the two countries, will satisfactorily account for this.

latter part of the autumn to the middle of the winter: and from January to Lent the Picardy and Santerre sheep are killed, and those that are fattened in the neighbourhood of Beauvais.

In addition to these the graziers of Lorraine go to Germany and buy lean sheep at Aix, Hanover, Paterbonne, Veterave, and Valdeck, which they fatten for the Paris markets. Burgundy also sends a few sheep from time to time, and likewise small flocks come from Hainault and Artois, independent of those that are sent in July. Paris draws one-third of its supply of sheep from the country within thirty miles around it; one-third from the Ardennes, Alsace, Lorraine, and the German states to which the graziers of Lorraine travel, and the remaining one-third from the districts already mentioned.

All these animals come to the markets of Sceaux or Poissy, where they pay a toll, and no sheep must be bought by the butchers without a passport from these places.

It would naturally be expected, that, divided from Spain by the Pyrenees alone, France would be the first to avail herself of the advantage of improving her flocks by crossing them with the Merinos. In the early part of the eighteenth century a project of this nature was entertained by the illustrious statesman Colbert. At his own expense several Merinos were brought across the mountains; but his plan met with the opposition which attends every new undertaking, and was abandoned, leaving no trace of improvement behind.

Thirty years afterwards M. de Perce imported a little flock of Merino sheep, and he crossed some of the indigenous breeds with this foreign race. The experiments were attended with so much success, that the public attention was awakened to the subject. M. Trudaine, the intendant of finance, was most earnest in his wish to ameliorate the French fleece, and to render his country as much as possible independent of the neighbouring states for the material of the woollen manufacture. He consulted with M. Daubenton, who had written one of the earliest, and still one of the best works on the general management and diseases of the sheep. The result was that in 1776 rams and ewes were procured from Roussillon, a breed that has just been described as one of the best in France, and approaching the nearest to the Merinos, and other sheep from Flanders, England, Barbary, Thibet, and Spain. These animals were placed on a farm near Bourgogne, in a district somewhat mountainous, and therefore favourable to the production of fine wool, the grand object of the experiments to be made.

M. Daubenton experimented on these sheep during seven years. He kept some of all the breeds perfectly pure, and he mingled others in every possible way. The result was that he was enabled to produce from every breed, properly crossed, a wool equal to that from the best Spanish sheep.

This conclusion was unexpected, and, as it afterwards seemed to appear, either was not founded on a sufficient number of accurate experiments, or required more care and attention than sheep-masters generally would or could bestow, in order to secure the continuation of such a result. One thing however was beyond contradiction,—that the Spanish sheep in other countries, and under modes of management different from those to which they had been accustomed in their native clime, would retain every valuable quality for which they are so justly celebrated.

On this the French government acted; and in 1786, 376 ewes and lambs were purchased in Spain, and sent to Rambouillet, in the neighbourhood of Paris, where was an agricultural establishment expressly devoted to the improvement of the domesticated animals. Sixty of them died on

their passage. Thirty-five ewes, and sixty lambs, were afterwards destroyed by the *claveau*, a disease of the skin—a kind of sheep-pox, fortunately, almost unknown in Great Britain.

The Rambouillet flock gradually increased, and a few were given to those agriculturists who appeared to be disposed to bestow sufficient care on their cultivation. This was an ill-advised measure. That which could be had as a gift was deemed to possess little value; and the new breed had not justice done to it. It was then determined that an annual sale of a portion of the stock should take place. The first sale was in 1796, ten years after their establishment at Rambouillet. The average weight of the fleece in the yolk was then 6 lbs. 9 oz.; the average price of the fleece 5 francs—the average price of the sheep, 71 francs for a ram, and 107 francs for a ewe, and the highest price at which a single sheep sold was 200 francs. Five years afterwards the flock had so much improved in public estimation, and in real value, that the average weight of the fleece was 9 lbs.—its price 28 francs; the average price of the ram 412 francs, that of the ewes 236 francs, and the highest price of any of the sheep 630 francs.

The most rigorous examination was instituted; and the superfine wools obtained in France from the pure breed, were worked into cloths in every respect as good as those from the *refina* or *prima* wool of the best breeds in Spain. The wool produced from the mixed breed, after the fourth or fifth cross, when made into cloth, was equal to that manufactured from superfine Spanish wool.

In order to perfect the undertaking, a publication on the treatment of sheep was drawn up by M. Gilbert, under the patronage of government; a practical school for shepherds was instituted at Rambouillet, and two other depôts for Merino sheep were established, one at Pompadour in the department of the Corrèse, and another at Perpignan in Rousillon, at the foot of the Pyrenees *.

These statements would seem to be highly encouraging;—but so systematically had the sheep been neglected in France, and so inveterate were the prejudices of agriculturists generally, that when an account was taken of the number of sheep in 1811, five-and-twenty years after the establishment of the flock at Rambouillet, there were thirty millions of the native breeds, and only two hundred thousand pure Merinos.

At the sale of Merinos at Rambouillet in 1834, the average price of the ram was 328 francs, and the greatest sum given for the best 510 francs. The average price of the ewe had sunk to 108 francs, and the highest price of the best was only 210 francs.

It may therefore be concluded that the Merino sheep and the Merino wool will never be extensively cultivated in France. In fact, from the character of the French wools generally—long and coarse,—a different

* The following is Mr. Trimmer's account of the Rambouillet flock which he visited in 1827. It was evidently written under the influence of much prejudice:—"The sheep in size are certainly the largest pure Merinos I have ever seen. The wool is of various qualities, many sheep carrying very fine fleeces, others middling, and some rather indifferent; but the whole is much improved from the quality of the original Spanish Merinos. In carcase and appearance I hesitate not to say, they are the most unsightly flock of the kind I ever met with. The Spaniards entertained an opinion, that a looseness of skin under the throat, and on other parts, contributed to the increase of fleece. This system the French have so much enlarged on, that they have produced in this flock individuals with dewlaps almost down to the knees, and folds of skin on the neck, like frills, covering nearly the head. Several of these animals seem to possess pelts of such looseness and size, that one skin would nearly hold the carcases of two such sheep. The pelts are particularly thick, which is unusual in the Merino sheep. The rams' fleeces were stated at 14, and the ewes' 10 lbs. in the grease. By washing they would be reduced half, thus giving 7 and 5 lbs. each."—Trimmer's Practical Observations, p. 45.

kind of improvement,—a different kind of wool is necessary, in order to perfect the manufacture of serges and stuffs, and bombazines in that country, and—the principal object of all—to enable the native wool of France to be used to any considerable extent in the preparation of these goods. It is singular that this point of paramount importance to the woollen trade of France should have been so long overlooked. It is to be traced to that mutual jealousy and alienation which have much too long existed between France and England.

A long breathing-time of peace has enabled the French woollen manufactories to revive, and with this the demand for foreign wool, and wool which Britain alone could supply. In the year 1833, no fewer than 1,424,208 lbs. of long wool were imported from England. The French government was alarmed at this increasing demand for a foreign material; and in October, 1833, sent a competent person to England, to inquire into the character and mode of treatment of the British long-woolled sheep, and to purchase a flock by means of which either a pure breed—(the improved Leicesters were wisely chosen)—might be established in France, or the native breed materially improved.

A considerable number of the Leicesters were in that year imported into France; but whether it was that the management of them had not been sufficiently studied, or that they had been placed on pastures that were not suitable to them, the greater partdied in a very short time, and then, as the reporter on this subject to the Royal and Central Board of Agriculture at Paris, the Viscomte Debonnaire de Gif, very naïvely remarks, speaking of his countrymen,—"As it is our character to seize with avidity on new ideas, and quickly to abandon them when unexpected obstacles arise, the hope of naturalizing in France the long-woolled sheep of England completely vanished." A few steady agriculturists, however, had continued to cultivate them, and not only the unmixed breed retained all its primitive excellence, but the French breeds that had been crossed by them yielded a longer, a sounder, and yet a finer fleece; and the size of the animal and the quality of the flesh were considerably improved. One of these gentlemen, M. Duverger, residing near Varsailles, had retained a flock of more than 200 pure Leicesters.

The demand for British wool continuing to increase, a commission was appointed to examine these sheep. The report was most favourable, and the director of the school of Alfort, M. Yvart, was dispatched to England, in order to procure a new importation, and, if possible, of more valuable sheep. He arrived in Leicestershire in October 1833,—he selected 110 ewes and 12 rams of the Bakewellian breed—and under his superintendence they were disembarked at Havre, and arrived at Alfort without the loss of a single sheep; and in the succeeding five months they lost only two sheep, and these from "the blood"—inflammatory fever.*

On the 25th of March, 1835, the same nobleman made a second report on the state of this flock. It had been transported to a farm at Maison Alfort, on the road to Melun, and after having been in France two winters and a summer, had increased to nearly 300. Many of the first lambs were two-thirds grown, and promised well, and the flock generally seemed to be in perfect health. The losses had been at the rate of 11 in 100, and had principally arisen from *red water*, which had appeared as an epizootic in the neighbourhood of Alfort, and had destroyed a great many sheep of all breeds. The Leicesters had become habituated to the French shepherds and dogs—they retained their natural quiet habits, wandering far less over the pastures

* See a very interesting report of this proceeding, Annales de l'Agriculture Fran., third series, tom. xiii. f. 261.

than the French or Merino sheep,—they were likewise less difficult in the choice of their food than either of the others, and evidently fattened more quickly than them. It was obvious, however, that they could not be driven so far or so fast to pasture as either of the others.

They had been shorn in the preceding summer, and their fleece had not suffered the slightest deterioration either in length, soundness, or lustre. Five lambs between 11 and 12 months old had been slaughtered, weighing when alive 481 lbs. or 96 lbs. each, and yielding in carcass 231 lbs., suet 24 pounds, and wool 47 lbs. Five wethers between 24 and 25 months old weighed, when living, 604 lbs., or nearly 121 lbs. each, and yielded in carcass 326 lbs., suet 36 lbs., and wool 40lbs.: the meat was of the finest quality, and attracted general observation.

Several of the young ewes have been parted with to the neighbouring farmers,—some of the rams have been let at the average of 50 franks each, and it is the intention of government to have an annual sale and letting. "We think," concludes the reporter, "that the question of the naturalization of the English long-woolled sheep in France is now determined in the affirmative—that without neglecting the cultivation of the Merinos, which during the last forty years have done so much for France, there is another breed equally worthy of care—and that the Leicesters, placed as now, where before there were only ordinary sheep, and where a good supply of food may be constantly calculated on, will yield to the breeder by their wool, and yet more by their flesh, a recompense fully equal to that which the Merinos would give, and will exercise a happy influence on the prosperity and agricultural and manufacturing industry of France*."

No apology is made for the length of these extracts, but the reader and the author of the present treatise will equally unite in wishing that the predictions of the commission may be fully accomplished.

There is nothing peculiar in the French management either of the Merino or Leicester sheep.

THE NORWEGIAN SHEEP.

Next in order of time stands Norway. The Norwegian sheep do not differ much from those of Sweden. The legs are long—the carcass has likewise an appearance of length and unthriftiness, and the wool is coarse and moderately long. One of their earliest natural historians says that some English sheep were imported as a stationary breed, and with a view to the improvement of the native ewes; but they speedily degenerated, and after the third or fourth generation were hardly superior to the natives†. He also relates that in the islands on the coast of Norway there are many wild sheep, that are never housed or taken care of, but are annually caught to be shorn. Later travellers speak of the same breed as existing in a wild state amidst the snows without receiving attention or food from man, and so untamed and untractable that they cannot be taken unless they are fairly hunted down by a person on horseback. Efforts have been made to reclaim and domesticate them, but they have rarely survived the first year of their confinement. They appear to belong to the primitive fat-rumped breed, for Pontoppidan affirms that "their fat is found in their external parts, and covers their flesh like a warm cushion." The same author likewise asserts, which seems singular in so cold a climate, that "when in summer they are turned out upon the mountains they are so exceedingly tormented with the heat, and with gnats and musquitoes, that they run about regardless of danger, and in this frenzy many have lost their lives, falling

* Annales de l'Agricul. Fran., third series, tom. xv. f. 282.
† Pontoppidan's Natural History of Norway, Part II. p. 6.

down the precipices; on this account the peasants build rude huts for them, into which they may retreat from their tormentors *."

A partial improvement is said to have been effected in the Norwegian sheep by a Spanish ram that was wrecked about the middle of the last century on the western coast. The sheep in the neighbourhood of Smaalchaem produce better wool than in many other parts of Norway. A few of their fleeces have weighed six or seven pounds. That which has probably tended much to render the Norwegian sheep more deteriorated than even cold and starvation could effect, is the custom of frequent shearing. Lasteyrie says that they are shorn twice, thrice, and even four times in the course of a year. He is probably mistaken in this assertion; for such a practice must be so decidedly injurious both to the sheep and the fleece, that it could not be tolerated for the shortest period of time. The rapid growth of wool immediately after shearing is in all sheep accompanied by a slight degree of fever and debility, and the recurrence of this several times in the year must tend to weaken the animal and interfere materially with his condition. It may be further remarked, that although there may be somewhat greater weight of wool from the two shearings than from the one, on account of this rapid growth of the wool after the top covering is removed, yet it is a coarse kind of wool that is thus produced; it is hard and large for the temporary defence of the denuded skin, and the finer and more valuable part of the wool is always found near the root, sheltered from the influence of the sun and air†.

THE DANISH SHEEP.

These are, in many respects, not unlike the sheep of Sweden and Norway. The head is long and thin, the neck arched, the eyes small, the countenance wild, the legs and tail without wool. In some parts of Holstein they are without horns, and, like a few of the wilder kinds of sheep already described, they have two appendages of skin hanging from the upper part of the throat. They are of moderate size, and their wool of a medium length, and which may be used either for the card or comb. It is shorn only once in the year. These sheep are rarely or never housed.

In the Duchy of Holstein, quite on the southern part of Denmark, is a peculiar and valuable breed of sheep, and bearing considerable analogy to some of the primitive ones. They are of a moderate size, polled, yielding fine wool, but not in great quantity: the tail is broad and fat to a very considerable degree towards the root, and gradually diminishes in size and terminates almost in a point. A bell-wether here, as in Spain, answers the purpose of a dog for the guidance of the sheep, or, should a sheep, more discontented than his fellows, show a disposition to wander, he is coupled for a few days with one of a quieter character.

About the year 1780, the Danes began seriously to think of ameliorating their native breed by the introduction of the Merinos; a few of them were therefore imported, but from some neglect or mismanagement they evidently and very soon deteriorated. In the hands of some agriculturists they supported the reputation of their breed; but the few that were properly cultivated made little or no impression on the general character of the Danish sheep.

In 1797, the government wisely determined to operate on a larger scale. A flock of 300 Merino sheep, composed of some of the best breeds of the Leonese Transhumantes, was procured and located on a farm at Esserum, about twenty miles from Copenhagen. They were carefully and skilfully

* Pontoppidan's Natural History of Norway, Part I. p. 32.
† Lasteyrie, p. 148.

managed, and although they have not superseded the native breeds, nor in every province effected much change in them, yet they have in many places improved the general character of the sheep and wool, and enabled the Danes to export from Copenhagen alone more than 800,000 lbs. of wool, nearly half of which, and of the finest quality, reaches the English market.

THE SHEEP OF THE FEROE ISLANDS.

These islands, situated in the Northern Atlantic Ocean, and to the N. W. of the Shetland Islands, and between them and Iceland, contain much fine pasture for sheep, and a small and wild breed of these animals. Mr. Wilson observes, that Dicuil, who wrote in the year 825, describes these islands of Feroe as being covered with innumerable flocks. Landt says, that the principal island contains a great number of small sheep, which are black, with short curled wool, their flesh having a peculiarly dark appearance, and in taste approaching near to that of other wild animals. Mr. Wilson adds, that Mr. Trevelyan visited the Feroe islands in 1821, and found the remnants of the wild race in no way dependent on, or under the control of man. They are sometimes caught by dogs, but can seldom be obtained except by being shot, or intercepted in a narrow space and driven over the cliffs. The wool was remarkably short, and, in the opinion of this gentleman, the flesh, though lean, was palatable *.

THE ICELAND SHEEP.

The sheep of this frozen climate are of two kinds; a small, and probably the native breed, in colour varying from dun to almost black, and a larger white breed, probably imported from a more southerly region. The coat is that which nature would give to the inhabitants of such a clime. It consists of long coarse hair externally, and a close layer of wool within, which no wet or cold can penetrate. This wool, however, when freed from the hair, is of little value for manufacturing purposes, and is fit only for horse and collar cloths, and common rugs and blankets. Many of the last are exported to North America.

Even in so cold a country they are rarely sheltered from the winter's storm, nor is any provision made for the winter's food. Their only refuge is the jutting rock, or the mountain cavern. In their haste to reach these places, when overtaken by a storm, and the snow driving against them and confusing their vision, many are precipitated down the cliffs, and drowned in the sea beneath. If they are surprised by a snow-storm before they can reach the coast, they turn their heads towards each other, and huddle together in a round close body, the united heat of which raises a dense vapour that penetrates through the snow, and directs the shepherd to the place where his flock is buried, although not always until the sheep are nearly starved, and have begun to feed on each other's wool in order to preserve life†. Livingston adds, that in the cold nights, without snow, "and when the bleak wind pinches them, they keep each other warm by pressing close together; and those in the centre relieve in turn those who in the outer part of the circle are exposed to the greater severity of the blast: thus, necessity

* Quarterly Journal of Agriculture, vol. ii. p. 542.

† Kerguelin affirms, that when the sheep have once been driven to this sad extremity, they will afterwards, even on the most plentiful food that Iceland affords, frequently nibble and tear the fleece of their companions. The habit becomes so inveterate, and the appetite for this strange nutriment so strong, that it seems a kind of mania, and the farmer is compelled to destroy these sheep.—Voyage to the North. Anderson seems to entertain a similar opinion.

sharpens the inventions of beasts as well as of men*." The only kindness which these animals receive from their keepers in the winter is, being fed on fish bones, or frozen offal, when their natural food is buried too deep even for their ingenuity and patience to reach it. Yet they repay all this neglect with a supply of wool, of which mention has just been made, and which to the Icelander is valuable; and also a quantity of milk, far superior to that which is yielded by any southern flock. If Von Troil is to be believed, an Iceland ewe will yield from two to six quarts a day†.

The principal peculiarity about these sheep is the number of their horns, the greater part both of the small and the large breed having more than two, and a few of them carrying eight horns. They commonly have three or four, or five, most of them of a spiral form, yet often but little developed; the side horns are curved in various directions. This cut contains a portrait of one with three horns.



[*Iceland Sheep.*]

When the horns do not exceed five they are placed in one row, and all of them springing from the frontal bone, on which, as in the sheep of Cyprus, there is a high and strong ridge, in order to form a proper basis for the horns. When there are more than five horns they are placed in two rows; but still they are prolongations of the frontal bone and of that alone. This invariable position of the base of the horns will be more fully illustrated when the skeleton of the sheep is described. It is worthy of remark, that while the sheep of Iceland are, with very few exceptions, many-horned, the cattle are polled.

THE AZORES SHEEP.

Before the reader returns to the continent it may be stated that the sheep of the Azores islands, in the Atlantic, off the coast of Portugal, and nearly in the same latitude with Lisbon, contain numerous flocks of sheep, many of them nearly or quite wild. They are cultivated for their

* Livingston on Sheep, p. 19. Quarterly Journal of Agriculture, v. ii. p. 541.
† Von Troil's Letters on Iceland, p. 133.

wool alone, which is manufactured into a coarse species of cloth for the consumption of the inhabitants. Their flesh is rarely eaten. The miserable and arbitrary policy which prevails in these islands, the system of short leases, and the absence of practicable roads, sufficiently account for the wretched state of sheep-husbandry, and of agriculture generally*.

THE SAXON SHEEP.

The Elector of Saxony ranks among the first who patriotically and wisely devoted himself to the improvement of the inferior breed of sheep which pastured on the neglected plains of Germany. The indigenous Saxon breed resembled that of the neighbouring states: it consisted of two distinct varieties, one bearing a wool of some value, and the other yielding a fleece applicable only to the coarsest manufactures.

In 1765, at the close of the Seven Years' war, the Elector imported one hundred rams and two hundred ewes from the most improved Spanish flocks, and placed a part of them on one of his own farms in the neighbourhood of Dresden; this portion he kept unmixed. He endeavoured to ascertain how far the pure Spanish breed could be naturalized in Saxony. The other part of the flock was distributed on other farms, and devoted to the improvement of the Saxon sheep.

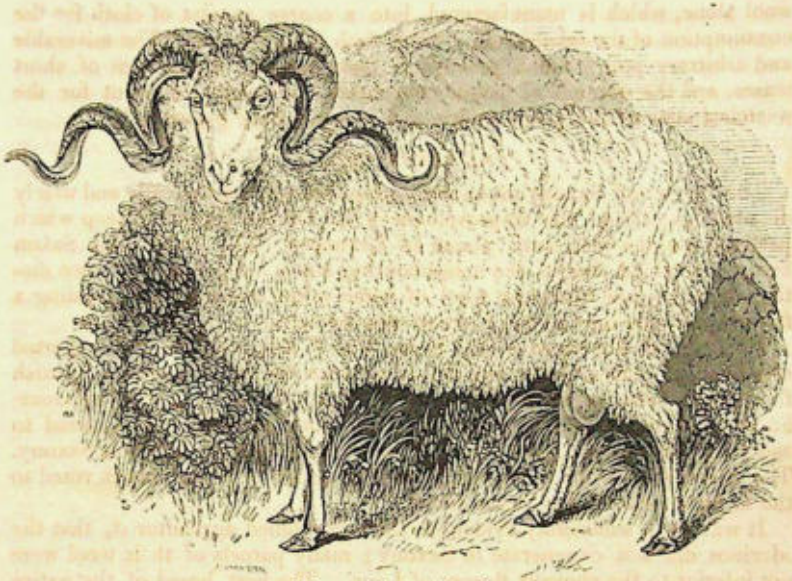
It was soon sufficiently evident to the enlightened agriculturist, that the Merinos did not degenerate in Saxony; many parcels of their wool were not inferior to the choicest fleeces of Leon. The best breed of the native Saxons was also materially improved. The prejudice against every innovation on the practice of their ancestors was, however, as strong in Saxony as elsewhere, and the majority of the sheep-masters were still averse to the improvement; but the Elector was determined to accomplish his object: he imported an additional number of the Spanish sheep, and then, adopting a measure unworthy of such a cause, he compelled those who occupied land under him to buy a certain number of the Merino sheep.

It was not necessary long to pursue this compulsory system: the most prejudiced were soon brought to perceive their true interest. The pure Merino breed rapidly increased in Saxony; it became perfectly naturalized; nay, after a considerable lapse of years the fleece of the Saxon sheep began not only to equal the Spanish, but to exceed it in fineness and in manufacturing value.

By referring to page 155, it will be seen that a sample of picklock Merino wool was $\frac{1}{700}$ths of an inch in diameter, and exhibited 2560 serrations in the space of an inch; while the Saxon wool (see page 89) was only $\frac{1}{1000}$th of an inch in diameter, and presented 2720 serrations of an inch. Corresponding with this, and most satisfactorily illustrative of the account which has been given of the structure of the fibre of wool and its felting property, and manufacturing value as dependent on that structure, the price—the true test of value—of the best Leonese Spanish wool in 1834, varied from 2*s*. 6*d*. to 4*s*., while that of the Saxon wool was from 4*s*. 9*d*. to 5*s*. 3*d*. per lb.

The government of Saxony very materially contributed to this result by the establishment of an agricultural school, and other minor schools for shepherds, and by distributing certain publications which plainly and intelligibly explained the value and proper management of the Merino sheep. The government of a country may fail to accomplish many capricious or tyrannical objects, but it will receive its best reward in the full accomplishment of its purpose, when it thus identifies itself with the best interests of its subjects.

* Boyd's Azores, p. 42.



[*Saxon Merino Ram.*]

The above is a portrait of a Saxon Merino ram, the property of Lord Western, and used by him extensively and beneficially in the improvement of his Spanish Merinos. It will be seen that his frame differs materially from the Spanish Merino: there is more roundness of carcase and fineness of bone, and that general form and appearance which indicate a disposition to fatten, and are tolerably certain pledges that the carcase will not be entirely sacrificed to the fleece *.

In Saxony, as in Silesia, although the sheep are housed at the beginning of winter, yet they are turned out and compelled to seek, perhaps under the snow, a portion of their food whenever the weather will permit; and the season must be unusually inclement in which they are not driven into the courts at least for two or three hours during the middle of the day. The doors and the windows also are frequently opened, that the sheep-houses may be sufficiently ventilated. Some sheep-masters, whose convenience is promoted by such a system, keep their flock in the house or the yard during the whole of the year, and it is not believed that the sheep suffer from this either in their health, or in the fineness of their fleece. A great quantity of salt is usually given to the Saxon sheep, and principally during the summer, either in their drink or sprinkled among the fodder.

Very great care is taken by the Saxon sheepmaster in the selection of the lambs which are destined to be saved in order to keep up the flock: there is no part of the globe in which such unremitting attention is paid to the flock. Mr. Charles Howard, in a letter with which he favoured the author, says, that "when the lambs are weaned, each in his turn is placed upon a table that his wool and form may be minutely observed. The finest are selected for breeding and receive a *first* mark. When they are one year old, and prior to shearing them, another close examination

* It has, however, been strangely asserted by Mr. Trimmer, that while by the *constant* "confinement of the sheep in winter in houses the wool has become delicate, the sheep have degenerated into a puny, weak race, producing only half the weight of wool and mutton which the parent Merino stock from which they sprung yielded!"—See Trimmer's Practical Observations, p. 3.

of those previously marked takes place: those in which no defect can be found receive a *second* mark, and the rest are condemned. A few months afterwards a third and last scrutiny is made; the prime rams and ewes receive a *third* and final mark, but the slightest blemish is sufficient to cause the rejection of the animal. Each breeder of note has a seal or mark secured to the neck of his sheep, to detach or forge which is considered a high crime, and punished severely."

THE PRUSSIAN SHEEP.

In most of the states of Prussia, the wool about the middle of the 18th century was of a very inferior quality, and used only in the manufacture of coarse goods; indeed, the soil was naturally barren, and a great part of the land either lay waste, or was covered with water. A few of the Prussian agriculturists believed that their country was capable of material improvement, and struggled hard, and with variable success, in order to ameliorate it. Among the foremost was M. Fink, near Halle, in the Duchy of Magdeburgh. The sheep in his neighbourhood were even inferior to the usual breeds: their wool was coarse and not abundant; it was suited only for the most common and low-priced goods; and the carcase was far from being profitable.

He first looked anxiously for the means of improvement among the breeds of the neighbouring provinces. In 1756 he introduced into Magdeburgh the Silesian breed, which had long been celebrated for the comparative fineness of its wool. The Merinos soon afterwards began to be established in Germany, and the advantageous change which they had effected in the character of the sheep wherever they had been introduced, could not be disputed. Notwithstanding this, M. Fink was unwilling to give up altogether the breeds of Germany, and in 1768 he purchased some Saxo-Merino sheep; his flock was materially improved, but still his object did not seem to be perfectly accomplished, and in 1778 he imported some pure Merinos from Spain. He took as the guide of all his experiments that which is now received as an axiom among breeders, that the fineness of the fleece, and, to a great degree, the value of the carcase too, are far more attributable to the inherent quality of the animal than to any influence of climate or of soil. Uniformly acting on this fundamental principle, and being most particular in the selection of the animals from which he bred, he improved his own native flocks to a considerable extent, and he succeeded to a degree which he had not dared to anticipate, in naturalizing a still more valuable race of animals.

His zeal and his success attracted the attention of the Prussian Government, which at this time had begun to turn its attention to the cultivation of agriculture generally, and particularly the amelioration of the fleece. Frederick II. in 1786 imported one hundred rams and two hundred ewes from Spain; but, illustrative of the difference in result when an organized plan is conducted by one acquainted with all its details, and whose heart is in the affair, and when it is committed to those who know and care little about it, the greater part of the sheep that were distributed in the neighbourhood of Berlin perished by various diseases; those that were sent to distant farms in the country degenerated, and the advantage was far from commensurate with the expense.

The monarch, however, had in M. Fink a proof of the possibility of perfect success, and he persevered: other sheep were introduced. M. Fink was commissioned by the Government to purchase a flock of one thousand of the choicest Merinos; agricultural schools were established, and at the head of one of them was placed the most competent of all persons—the first improver of the Prussian sheep.

As a proof of the increased value of the Prussian breed, M. Lasteyrie, who had an opportunity of examining the flocks of M. Fink, says, that "the sheep are less than the Merinos found in Spain, but are by no means inferior to them in perfections of fleece. Before the improvements had taken place the native breeds produced wool that sold from 11 to 18 dollars per quintal of 100 lbs., (from 5*d*. to 8*d*. per lb.) but now, improved by the use of Spanish rams, it sells from 60 to 85 dollars per quintal," or from 2*s*. to more than 3*s*. per lb. *

The most ingenious and the most experienced men are liable to some inconsistencies; and M. Fink stoutly maintained two principles, which further experience in the breeding and management of the sheep has caused to be abandoned: first, that "food of a good quality, be its nature what it may, does not alter the fineness of the fleece, but merely causes an augmentation or diminution of weight in proportion to its abundance or succulence, and the reverse." The change in the character of the British wool since the introduction of turnip-husbandry and increased attention to the weight of the carcase, affords an unanswerable refutation of this opinion.

He also asserted, that "breeding in and in will not produce the slightest degeneration;" and yet, as if conscious that he was wrong, he changed his rams every third year if he could meet with animals that carried a finer wool, or even as fine as that already produced in his own flock. The influence of the system of breeding *in and in*, as it regards the sheep, will receive due consideration in the proper place.

A brief sketch of his system of management may not be unacceptable to the reader.

He properly maintains, that free exposure to the air is favourable to the quality of the wool, and therefore, although the sheep are housed at the beginning of November, yet whenever it freezes, and the ground is hard, even although it may be covered with snow, the sheep are driven to the wheat and rye fields, where they meet with a kind of pasturage exceedingly wholesome, and while they feed there they are likewise benefiting the crop. Nothing is more common than to see a flock of valuable sheep scratching away the snow with their feet in order to arrive at the short wheat or rye beneath. When the weather will not permit their being taken out, they are fed on hay, aftermath and chopped straw of various kinds. The kind of straw is changed as often as possible, and wheat, barley, and oat-straw and pease-haulm follow each other in rapid succession. The oat-straw is sparingly given, and the pease-haulm is preferred to the wheat and barley straw. Oil-cake, at the rate of six or seven pounds per hundred sheep, and dissolved in water, is also allowed when the flock cannot be turned on the young wheat.

Three or four weeks before lambing, an additional allowance of hay and straw is given to the ewes; and while they are suckling, a little oat-meal is mixed with the solution of oil-cake. When the weather will permit the turning out of the ewes, the lambs are still kept in the houses, and the mothers brought back to them at noon and night; after that, the lambs are not permitted to graze with the ewes, but are turned on the fallows or the clover of the preceding year; for it is supposed that they unnecessarily fatigue themselves by running with their mothers, and almost incessantly trying to suck, and that on this account they refuse the herbage on which they are placed, and take less nourishment than when quietly kept on separate pastures. A few barren ewes are, however, placed with the lambs for the purpose of guiding them, and perhaps teaching them to select

* Lasteyrie on the Merino Sheep, p. 166.

the best and most wholesome food. More lambs are saved than are necessary to keep up the flock, and when they are two years old they are inspected—one-third of the best of them are kept, and the remainder sold. The lambs are never shorn, in order that they may be better able to endure the cold and rain of autumn.

The Prussian sheep-dogs, like almost all on the Continent, are trained to obey the shepherds, and are skilful in guiding the sheep, but they never worry or bite them. There is no natural necessity for it any where; and if flocks are occasionally wild and intractable, bad management and bad treatment have made them so.

THE SILESIAN SHEEP.

The native sheep were small with long neck and legs, and the head, the belly, and the legs devoid of wool. In the districts of Namslau and Oels was a superior breed, so far as the wool was concerned. They were never folded; they were housed at night, even in summer; the sheep-houses were ill ventilated, and the dung removed from them only twice in the year.

M. Lasteyrie, the chief, or in fact the only authority in these matters, describes the labours of Count von Magnis to improve the Silesian flocks. When he retired to his vast estates at Eckersdorf, on which three thousand sheep were pastured, he found that the gross return from them amounted to only 1200 dollars (225*l.*) He first attempted to improve his smaller sheep by crossing them with the larger breed of Hungary; but not succeeding in this to the extent of his wishes, he had recourse to the Merinos. He spared no expense in order to procure the best rams: he sometimes gave as much as a thousand franks for a single ram. He laboured hard to produce an artificial pasture on a tract of country that would hardly produce any indigenous plants, for on scarcely any part of his estates would the rigour of the climate permit any pasturage during six months of the year. As his power of supporting his sheep increased, he increased their numbers, until his flock became thrice as numerous as at first. In process of time the wool yielded by the greater part of his sheep would bear comparison with that found on the best of Spain, and at length exceeded it in fineness and in value; and in the course of a few years his returns were multiplied more than twenty-fold. For the purpose of the best manufactures the Silesian wool is almost equally valued with the purest and finest Saxony.

THE HUNGARIAN SHEEP.

The Empress Maria Theresa, witnessing the success with which the Merino sheep were cultivated in Saxony, imported three hundred of them in 1775, and placed them at Mereopail in Hungary. An agricultural school was likewise established by her at the same place; but for a considerable period her laudable exertions were not attended with the desired success. The native sheep, varying in different districts, all of them produced an inferior kind of wool, and had, from time immemorial, been strangely neglected by the farmer. The worst pasture was their lot; they were often half-starved; their winter-houses were unventilated, and the dung removed only twice in the year; and they were consequently subject to numerous and fatal diseases. The milk procured from the animal was the principal, and in some districts might be said to be the only, object of the farmer's attention; and the manufacture of butter and cheese from this produce of the sheep was more valued than the application of the fleece to the manufacture of cloth. It is not therefore to be wondered at that the expectations of the sovereign were disappointed.

The progressive success, however, of the Saxon sheep-husbandry began

at length to make its due impression; and other Merinos were procured from Spain in order to improve the flocks of Hungary. In many cases, and those in late years rapidly increasing, the newly-introduced breed altogether superseded the native one; and if the Hungarian fleece is not, with the exception of a few choice specimens, quite so highly valued as that from Silesia or Saxony, it at least has rivalled and beaten the Spanish Merino in every market in the world. The chief wealth of Hungary is now derived from the cultivation of the sheep. How far the unequal distribution of the land thus employed may be favourable to the happiness of the people is a question which it comes not within the scope of this work to agitate—that it is favourable to the improvement of the sheep there can be no question. A recent statistical account gives to Hungary seven millions of sheep, of which three millions are the exclusive property of Prince Esterhazy.

HANOVERIAN SHEEP.

Hanover, being so closely connected with the English Government, must not be quite forgotten in the history of the German sheep. There were originally two breeds—one of a larger size, kept on the marshes, the carcase weighing from 80 to 100 lbs., and the fleece averaging from 5 to 6 lbs., but the flesh not good, and the wool coarse; and a smaller breed, resembling the old Rhenish and Saxon, with shorter wool, yet coarse of its kind, and of little value. Both kinds were badly managed. The farmer used to keep as many only as would supply his family with wool and milk. Almost every cottager had two or three. They were chained in pairs, and picked up their living on the dykes and other unenclosed spots. They were kept chiefly for their milk, all the Hanoverian cheese being made of ewes' milk alone. They were wretchedly poor, and when shorn looked little better than skeletons *.

Mr. Hodskin says that the smaller sheep have now been crossed with the Merinos, and yield fleeces as fine as any of the Meripos, weighing on the ewe from 2 to 2½ lbs., and on the ram from 4 to 4½ lbs., and that these sheep are now cultivated for the wool principally or almost exclusively; and he adds that the peace and communication with England had nearly doubled its price †.

The superiority of the German wool over that yielded by the Spanish Merinos is now fully established. Mr. Jowitt, in his evidence before the House of Lords, says, "I began with the Spanish wool; I then changed to the German, on account of its superior quality—in the manufacturer's phrase—proving better, and making a softer cloth. I was also able to spin it to a greater length—the very qualities in which the English wool is deficient." The Spanish wool is, nevertheless, often finer than the German; at the same price it generally is finer, but it has not the numerous curves and serrations. The trade in German wool is of recent date: it has sprung up since the year 1800. The manufacturers were at first prejudiced against it. They said that it was dirty, and that there was great loss of weight. The German wool is now, however, sent over in a better state; and its softness and spinning qualities are placed beyond dispute.

Mr. W. Ireland gives, in his evidence on the same occasion, a curious

* Farmer's Magazine, May, 1820.

† "The Hanoverian shepherds are generally dressed almost entirely in white linen. They wear large hats cocked up behind, and ornamented with a large steel buckle, and the men look very respectable and clean. They are paid in proportion to the success of the flock, and have an interest in watching over its improvement. They receive a ninth of the profits; but they also contribute on extraordinary occasions, such as buying oil-cake for winter food, when necessary. They also contribute one-ninth to the expenses of new stock. The head shepherd has two-ninths of the profits."—Hodskin's Travels in Germany, 1826.

account of the wool-stapling business in Germany. He says that the farms are generally small, and the wool collected by the Jews, who go about with a cart and pair of horses to the different houses. It is a large farm that has ten bags of wool. These are taken to the large merchants, by whom the fleeces are carefully examined, and those that are nearly of one quality are thrown together. The fleeces being thus arranged, the wools are sorted, and shipped by these merchants down to Hamburgh, and there consigned for England. The Jews frequently convey it to Hamburgh themselves, and most of the leading houses have their agents there. It is a fair open market, like those of Breslaw and Leipsic. He adds, "There is a great deal of expense and attention bestowed on the sheep: they are housed and nursed as carefully as the race-horse is in a sporting stable."

In every part of Germany and Austria, there are not only an increasing number of sheep bred purely or nearly from the Merinos, but there are many more that have a little of the Spanish blood in them. About the year 1819 the inferior wool from these sheep began to be imported, and was tried by the manufacturers. It was found to make a good second cloth, as good as used to be made by the South Down wool, and with less trouble, and consequently it began to be extensively used, not merely because at first it could be procured at a less price than the South Down wool, but it continued to be preferred when it cost two and three pence per pound more than the British wool. It made a softer cloth, and with less expense and trouble and loss in the manufacture. The importation of wool of this kind having once begun, an inferior and a still inferior description has followed, and which has often been perfectly unsaleable. This subject will be resumed hereafter.

THE FLEMISH AND DUTCH SHEEP.

It has already been stated (p. 121) that in the early part of the seventeenth century, the large Guinea sheep was introduced into the islands near the Texel and into Groningen, and called the *mouton Flandrin*, or Texel sheep. They there found a pasture suited to the improvement of their naturally long and gaunt form; they were crossed with some of the large native breeds; the English long-woolled sheep, and particularly the Romney, contributed more to their amelioration, and they are now a singular, but in many respects a valuable breed. They have somewhat decreased in size: they are seldom more than two feet six inches in height; they are polled, with long pendent ears; the leg is rather inclined to be long; the tail is short and large, and covered with wool; the fleece averages from ten to twelve inches in length, but it is far from being fine, and is devoted to the preparation of coarser goods.

In Friesland is a similar breed of sheep, but with more of British blood. It is of a larger size, measuring sometimes two feet nine inches in height, without horns, having pendent ears, a head so long as almost to approach to deformity, and the tail long and small, and generally devoid of wool. The wool is long, finer, and with more numerous curves, and can be appropriated to more valuable purposes. They have considerable resemblance to the British or rather the Irish long-woolled breed; but they have never quite cast off their original lean appearance and disinclination to fatten. They are more prolific than any English breed; their milk is valuable, and is used by the Dutch and Flemings in the manufacture of a considerable quantity of cheese of good quality*.

* An anonymous French work, but published by royal authority in 1763, and entitled "Instructions for breeding and perfecting the best kind of Sheep in Flanders," describes four kinds of Flemish sheep: the first he calls *frises*—the wool curled, frizzled at its ex-

The Merino sheep gradually found their way into Belgium and Holland. The precise date of their arrival is not recorded; but there was so essential a difference in the character and habits of the Flemish and Spanish sheep, and in the climate and soil and productions of the two countries, that, as might be readily expected, the experiment altogether failed.

In 1789, according to M. Lasteyrie, Mr. Twent, not discouraged by the failure of others, imported a small flock of Merinos. The sheep soon recovered the fatigue of their voyage, became reconciled to their new food and climate, and not only began to display their superiority to any of the native breeds, but continued to retain all their own peculiar excellence. In these countries, however, as in too many others, the value of the Spanish sheep was not duly appreciated by the agriculturist; and they never to any great extent established themselves in Belgium or Holland, either as a distinct breed, or as a source whence the native breed might derive much improvement.

THE MERINO SHEEP IN BRITAIN.

England was late in attempting to naturalize the Spanish sheep, or to improve her own breed by an intermixture with them. There was some excuse for this, for she already possessed a clothing wool equal or superior to that of any other sheep except those of Spain; and her maritime habits and the extent of her commerce gave her easy access to the finer wools, far less necessary to the manufacturer at that period than fashion has now made them: at the same time her native combing wool was perfectly unrivalled. A few Merino sheep, however, were introduced here and there, but they had much prejudice to contend with, and their value was not duly appreciated.

The monarch who, at the close of the eighteenth century, swayed the sceptre of Great Britain, was an ardent agriculturist, and he determined to give this celebrated breed of sheep a fair trial on his own farms. In the year 1787 measures were taken for the collection and importation of a little flock of Merinos. They were collected in Estremadura, on the borders of Portugal—a few from one flock, and a few from another. It

tremities. It answers to the second species mentioned in the text. He says that "it unites in itself the perfections belonging to every other breed without their defects: its walk is firm; its deportment noble; its form well proportioned in all its parts, announcing a good constitution and a healthy temperament, and exempt from the maladies so common to other breeds. The length of its wool is in proportion to its height, and it does not disfigure the animal as in the English sheep, whose fleece is a burdensome weight, especially at the return of spring (*de la belle saison*). The Flemish sheep carries nothing about him that in the least detracts from his beauty. His wool is white and without spot—it is of a dazzling whiteness; he is contented everywhere—everywhere he becomes a citizen of the place he inhabits (*il devient citoyen du lieu qu'il habite*)." It is a good kind of sheep enough, but it owes much of its value to English blood; and, after all, the Belgians and the Dutch are compelled to import annually three millions and a half of pounds of British wool, in order to make that of this unrivalled sheep available for the manufacture of the finest stuffs. The average price of this kind of sheep in store condition was about eighteen livres at that time, and thirty livres when fat, and the carcase weighed from 90 to 130lbs.

The second kind of Flemish sheep (that described first in the text) was called *grainés*, grained or granulated. The yolk was abundant, but lay on the fleece in a singular manner; the fibres appeared like a succession of grains attached to one another. A few of these sheep are occasionally seen at the present day. The staple was about nine inches long, and not so fine as that of the *frises*.

A third, or *middle* wool, did not exceed four or five inches in length. It was almost as fine as that from the *grainé*, but inferior to that from the *frise*.

The fourth was a decided long-woolled breed, that which has already been described (p. 158) as the sheep of Picardy and Normandy.

The fifth was the wool *rauis*, so called from its shortness and hardness, not being more than three inches in length, found in small quantity, and little valued.

was a kind of smuggling transaction; and as they could not be shipped from any Spanish port without a license from the King of Spain, they were driven through Portugal and embarked at Lisbon, landed at Portsmouth, and thence conducted to the king's farm at Kew. They did not please the royal adventurer. Hastily selected, or obtained as they could be from various proprietors and various districts, there was no uniformity about them; they could not be said fairly to exhibit the true character of their breed, nor was it safe to make any experiment with them.

It was then determined to make direct application to the Spanish monarch for permission to select some sheep from one of the best flocks. This was liberally and promptly granted; and a little flock was draughted of the Negrette breed, the most valuable of the migratory flocks, and the exportation of which was expressly prohibited by law. They arrived in England in 1791, and were immediately transferred to Kew: the sheep previously imported were destroyed, or otherwise disposed of, and the experiment of the naturalization of the Merinos, and the crossing of them with the British sheep, may be then said to have commenced.

The management of these newly-imported flocks does not seem at first to have been very skilfully conducted. They were placed on a moist, and, perhaps, too luxuriant soil; and they became affected with the foot-rot; and in some situations, and to a fearful extent, their numbers were thinned by the liver-rot. This was, by those who were prejudiced against them, said to be the fault of the sheep; but a little change in the pasture showed that it was altogether attributable to the carelessness of the shepherd. The first winter had scarcely passed, ere they were acknowledged by impartial observers to be perfectly naturalized. They were as free from disease as the best of the British flocks.

Their wool was unaffected by the change of climate. The product of the second and third shearings was compared with the best samples of the imported Spanish wool, and it yielded not to them in fineness or felting quality. Many a year afterwards the experiment was repeated, and with the same success.

Several of the British ewes were crossed with the Merino ram, and the following were some of the early results: Mr. Bartley experimented on the Wiltshires, and after a few crossings the ewes became hornless; they had acquired the almost perfect shape of the Merino; the wool increased from 3½ to nearly 6 lbs. per fleece, and it was little inferior to that from the pure Spanish sheep *.

Mr. Tollet crossed the Ryelands with the newly-imported sheep, and he selected those of the native breed which carried the best clothing wool; and he found that the fleece which used to weigh little more than 2 lbs. increased to 3 lbs., and its average value rose from 2*s.* to 3*s.* per lb. Dr. Parry also crossed the Ryelands with the Merinos. After the fourth cross the wool was as fine and valuable as that of pure Merinos †.

* Agricultural Mag., May, 1803.

† The following account of this best breed of Anglo-Merino sheep may not be unacceptable to the reader: "They are a breed of considerable bone, length, and breadth of carcase, but wanting in that rounding of form which seems to constitute the beauty of our best or most improved native breeds. They are docile to a remarkable degree, leading about very handily. Their bodies, bellies, and legs, down to the hoofs, are covered with a thick elastic fur, which certainly must be a greater protection against either wet or cold than the open fleeces of most of our native sheep. The best of the wethers weigh on the average about 8½ stones, or 171bs. per quarter; and the mutton always bore a preference in the market."—Agricultural Mag., Aug. 1806.

As a trial of the manufacturing worth of the wool of this sheep, a certain quantity of Dr. Parry's wool, from Ryeland ewes, and crossed by the King's and Lord Somerville's rams to the fourth generation, was selected, and an equal quantity taken from a pile of

Mr. Coke experimented on both the Ryelands and the South Downs, and he affirmed at one of the Holkham meetings, that "the cross of the Merino and the South Down was much better than that of the Merino and the Ryeland*."

Mr. Hose, of Melton Mowbray, put a certain number of Leicester ewes to a ram of the same breed, and an equal number to a Merino ram. The result was, that the Leicester fleece weighed 7lbs., and that from the cross with the Merino 8lbs.; and that the former brought in the market 1*s.* per lb., and the latter, 1*s.* 6*d.*, being a gain of 5*s.* on the fleece. The carcase of the former, however, weighed 27 lbs. per quarter, the latter only 25 lbs., being a loss of 8lbs. of mutton.

The Merinos found some early and zealous advocates, and among them Sir Joseph Banks, and Lord Somerville (who, at his own expense, imported a considerable flock of them); and Dr. Parry stood foremost in publicly recommending an almost universal trial of them, either pure, or mixed with the native breeds. One writer (Mr. Bartley) thus enumerates their supposed excellencies: "They produce wool in a much greater quantity than any species of British sheep from equal quantities of pasture, and equal feed. Far from the slightest appearance of deterioration, they manifest indubitable evidence of general progressive improvement, especially in the quality and value of the fleece. They possess an aptitude to fatten at an early period, and the quality of the mutton is excellent. They resist the effect of cold, inclement weather, to a degree, equal at least to the hardiest of our native breeds, being defended by a closer, heavier, and more impervious covering. They produce short wool, in no way inferior to that imported from Spain; and a single cross will considerably increase the weight of the fleece in our long-woolled sheep, still retaining the suitable staple as combing wool †."

On the other hand, they had much prejudice to encounter, arising from their gaunt and unthrifty form—their actual deficiency of carcase—the inapplicability of their wool to the manufactures then most in request—and the natural prejudice of the inhabitants of a wool-growing country against any rival of the sheep which they and their forefathers had, from time immemorial, successfully cultivated. Their warmest advocate, Sir Joseph Banks, thus describes the difficulty which attended the establishment of the royal flock: "It was impossible to find a purchaser willing to give even a moderate price for the sheep or their wool. The shape of the sheep did not please the graziers; and the wool-staplers were utterly unable to judge of the merit of the wool, it being an article so many times finer and of more value than anything of the kind that had ever before passed through their hands ‡."

It was thirteen years after the arrival of the Negrette flock, ere they had been able to establish themselves in the good opinion of a sufficient number of agriculturists to render it prudent to expose them to sale by public

prime Leonesa Spanish wool: both of them were dyed and delivered to the manufacturer. According to the account of the foreman of the manufactory, "Dr. Parry's wool and cloth, *in every state*, worked more kindly than the other." When finished, his cloth was the finest, and that from the Spanish wool the stoutest. The cloths were numbered, and submitted to the inspection of several manufacturers and drapers, who unanimously decided in favour of the number which the Anglo-Merino bore; and the opinion of the Committee, as extracted from the Bath Society's Papers, was, that Dr. Parry "had by his zeal, diligence, and perseverance and activity, accomplished the grand object of producing in the British climate, and from British soil, wool equal to that usually imported from Spain; and that, by so doing, he had merited the warmest thanks of the country in general, and that Society in particular."—Bath Papers, vol. ii. p. 160.

* Agricultural Mag., July, 1810. † Ibid., Nov., 1804.

‡ Communications to the Board of Agriculture, vol. vi. Part 2.

auction. In 1804 the first sale took place. It was attended by the friends of the Merinos, and by others who, led thither by curiosity, were induced to become purchasers. One of the rams sold for 42 guineas, and two of the ewes for 11 guineas each. The average price of the rams was 19*l.* 14*s.*, and that of the ewes, 8*l.* 15*s.* 6*d.* each*.

At the second sale, in August, 1805, seventeen rams and twenty-one ewes were sold for 1148*l.* 14*s.*, being at the average of rather more than 30*l.* each†.

In 1808, the highest price given for a ram was 74*l.* 17*s.* The average price of rams was 33*l.* 10*s.*, and that of ewes, 23*l.* 12*s.* 6*d.*

The Merinos might now be considered, as, to a certain degree, established in public favour. They, with common management, still retained their fleece as heavy and as fine as when first imported; and, whatever breed they crossed, the uniform result was improvement, both in the weight and fineness of the wool, with some, but not proportionate, loss of carcase. They were more and more eagerly sought after, and experimented with; and in the sale of 1810, thirty-three rams sold for 1920*l.* 9*s.*, being on an average more than 58*l.* each. One full-mouthed Negrette ram was sold to Colonel Searle for 173 guineas; one for 134 guineas to Sir Home Popham; one for 116 guineas to Mr. Gale; one for 105 guineas to Mr. Sumner; and one for 101 guineas to Mr. Wools. Of the ewes, a full-mouthed Negrette was sold to the last-mentioned gentleman for 70 guineas, and two Paular ones for 61 guineas each, and a third for 65 guineas. One Paular was disposed of to Mr. Down for 92 guineas, and another to Mr. Willis for 60 guineas: 70 of them were sold in the whole, and they fetched, on an average, 37*l.* 10*s.* per head‡.

The first advocates of the Spanish breed of sheep saw all their predictions fully realized; and the number of sheep-masters was rapidly diminishing who had prejudice, or prudence, or foresight sufficient to resist the influence of the widely-spreading Merino-mania.

A Merino Society was instituted in the following year. It started with a phalanx of members, which, from their number, station, and influence, apparently secured its perpetuity. Sir Joseph Banks was the President. Fifty-four vice-presidents were appointed, and local committees were established in every county of England, Scotland, Wales, and Ireland. Premiums of 20 guineas were offered for the best pure Merino ram not more than twenty-eight months old, and 10 guineas for the second best; 20 guineas for the best ram not more than sixteen months old, and 10 guineas for the second; 10 guineas for the three best pure Merino ewes; 10 guineas for the best pen (consisting of five) of pure Merino wethers; 10 guineas each for the best pen of the first, second, third, and fourth cross of the Merinos with British sheep; and 10 guineas for the best fleece.

No more striking instance can be produced of the fallacy of human expectation and judgment, than the establishment of this Society. From this very period is to be dated the rapid decay of the Merinos in public estimation. They are a most valuable breed of sheep; they yield a wool, which in fineness and manufacturing quality was then unrivalled; they have materially improved the fleece of every short-woolled sheep which they have crossed, and have increased the length and weight of the staple, and adapted it for finer worsted stuffs; and it is not improbable, although the experiment has never been fairly tried, that, with careful management, the crosses being few and far between—they would give a finer and more

* Communications to the Board of Agriculture, vol. vi. Part 2.
† Agricultural Mag., Sept., 1805. ‡ Ibid., Sept., 1810.

valuable fleece to the long-woolled breeds; not injuring it for the purposes to which it is already applied, and rendering it useful for many other fabrics. It follows from this, that in every country where the farmer looks to the fleece, if not for his sole, yet his principal, remuneration, the Merino will be duly valued, and will gradually supersede every other breed. In Great Britain, nevertheless, where the system of artificial feeding is carried to so great a degree of perfection—where the sheep is so early and so profitably brought to the market—that breed, however it may ultimately increase the value of the wool, can never be adopted, which is deficient, as the Merinos undeniably are, in the principle of early maturity, and general propensity to fatten.

Another circumstance, and one of still greater consequence is, that the establishment of the Spanish sheep in other countries, and the additional quantity of their wool that is grown, have produced a revolution in the cloth manufacture. Those fabrics with which our ancestors were content are no longer articles of extensive commerce: they are no longer worn; and the wools of which they were composed are devoted to other purposes, and those so numerous and important, that there is, in fact, a greater demand for British short wool now, than there was previous to the introduction of the Merino sheep—a greater demand than the growers of short wool are able to supply. The short wool being now lengthened in the staple so much so as to have acquired a new name, and having also increased in quantity and weight on the sheep, and the carcase having likewise increased in weight, and the finer foreign wool being now to be purchased at a cheaper rate than it could be grown, it would be bad policy in the farmer to alter materially the character of the wool; for its greater quantity, added to the heavier carcase, will produce a more certain, and on the whole, a better remuneration than a finer, but lighter fleece, accompanied by a lighter carcase, could possibly give him *.

Mr. Coke, who had expressed the high opinion which has been quoted, (see page 179,) of the good result of crossing the South Down with the Merinos, was one of the first honourably and fully to retract that judgment which he had somewhat too hastily given. In the autumn of the very year in which the Merino Society was instituted, he thus addressed the meeting at Holkham:—"I feel it my duty to state my latest opinion of the

* Mr. Ellman, in his examination before the House of Lords, says, that "he abandoned the Merinos from the difficulty he had in selling them in a lean state. The graziers did not then like to have them. He then tried to feed them himself, but he found that he could fatten three South Downs where he could one Merino. He treated them as he should other sheep, but he never could fatten one of them well."

On the other hand, Mr. Trimmer, who had a considerable flock of them, says, "That in disposition to fatten they equal the South Downs, and the mutton is of the first quality."

Mr. Webb Hall, a warm advocate of the Merinos, says, that "They are the finest mutton in the world when made fat, but at present they are an unimproved-bodied sheep, capable, he thinks, of being still made the most valuable animal in this country."—Evidence before the House of Lords, in 1828.

The public has decided between these gentlemen. The Merinos did not afford a remunerating price in the carcase, and they were abandoned. As to the barrenness and bad nursing of the Anglo-Merinos, the prejudice existing against the Merinos may not be well founded to its full extent. That is strong testimony which Lord Somerville gives on this point. "On their first importation, there was a great deficiency of milk in the ewes, as well as a tendency to barrenness, which is now ascertained to have arisen from the severe journeys to which this race of sheep is twice in the year subjected when in Spain. They are now regular in their time of lambing; their udders are as full, and they are as good nurses, as any sheep I have ever seen. It was not till some years after their arrival in this country, when they had become inured to the climate, that any instance of double lambs occurred; now it is not an unfrequent occurrence."—Lord Somerville's Facts and Observations, p. 14.

effects of the cross of a part of my South Down flocks with Merino tups, and I wish it could be more favourable. From the further trial which I have made, (this, the fourth year,) I must candidly confess that I have reason to believe that, however one cross may answer, a farther progress will not prove advantageous to the breeder *." The real state of the fact, however, is, that from the year of the establishment of the Merino Society, and the opportunity which agriculturists had of putting to the test, on a larger scale, the value of the Merino sheep, they have sunk in the estimation of the sheep-master. There are few flocks of the pure Merinos now existing, and those few are rapidly declining—*the produce not being beneficial to the grower.*

It is folly now to say, as was long and even lately affirmed by the zealous advocates of the Merinos, that " the leading breeders of sheep had a great stake in the flocks which they already possessed, and the practical breeders of eminence, who made trial of them, were warped by prejudice and interest;" that dishonourable measures were resorted to in order to blast their fame; that " wool from inferior and mixed flocks of all kinds was attempted to be passed as the best and most pure, and that rams from inferior flocks were passed as those of the first blood †." After the establishment of the annual sales and the Merino Society, the case was brought fairly before the proper tribunal; or rather, the claims of the Merinos were backed with a zeal and influence seemingly irresistible; yet the British sheep-breeders, and the British public, decided, that no great and permanent change could be effected in the British sheep by means of the Merinos, without a more than proportionate loss.‡

The public are always too prone to run into extremes, and the Merinos are now as much unjustly depreciated as they were somewhat too hastily overvalued. Occasion will be found, in an after part of this work, to show how much good could be done, by one, or by an occasional cross of the Merino, on some breeds, and in certain localities.

The Saxon Merinos yield, as has been already seen, a finer and more valuable wool than any which is imported from Spain. At page 171 is the portrait of a Saxon Merino belonging to that experienced and scientific agriculturist, Lord Western, and with which he is improving his former Spanish breed, and crossing some of the native sheep. Sir H. Vavasour, of Melbourne Hall, near York, has likewise imported some Merino shearling ewes, and a ram from Saxony. The Saxony sheep are decidedly superior to those brought immediately from Spain, not only in their wool, but their general form and propensity to fatten. If the British sheep is ever destined to yield a finer wool, sacrificing little or nothing in point of carcase, it must be by means of the Saxon, and not the direct Spanish Merino. These were selected from a distinguished flock in the neighbourhood of Dresden; they were brought by land to Hamburgh, a distance of between five and six hundred miles, and thence shipped for Hull. Neither their

*Agricultural Mag., Aug., 1811. †Trimmer's Practical Observations.

‡ The reasoning of Mr. Plint on this point, in a letter with which he favoured the author, is decisive:—" I always thought the speculation of cultivating and shearing the Merinos a decidedly foolish and unprofitable one. We can consume all the coarse wool we grow, and more if we could get it; and, taking carcase and weight of wool together, the long-woolled sheep is more profitable by far than the Anglo-Merino. Besides, if the English breeds were to any considerable extent superseded by the Merinos, the price of that wool would fall, and long wools would rise; and the advantage of growing fine wool, on account of its high price, would slip through the fingers of the agriculturist. If we could grow more of both kinds, well and good; but in present circumstances, a profit by foreign wool is as good as a profit by fine wool, and we can only have one; and it is the part of wisdom to take that which is easiest got."

long journey, nor their sea voyage, in the slightest degree impaired their condition,—a proof of soundness of constitution which promises something as to their future usefulness.

Few of the Anglo-Merinos remain either in Scotland or Wales. Their reputation began to diminish, before it was deemed prudent to expose them to the open country and inclement seasons of the one, or that it would be possible for them to obtain a livelihood on the mountains of the other.

Ireland, however, has had some opportunities of testing the value of the Merino sheep. Reference has already been made to the numerous Merino flocks of Messrs. Nowlan, of Kilkenny. It originally sprung from seven ewes and one ram of the Paular and Negrette blood, which had been presented to those gentlemen in 1810, and a few that were added to them in the following year. In 1820 they had increased to 600. The quality of the wool had improved rather than deteriorated. The average weight of the clip in 1819 was 6½ lbs., the price of the wool was 3*s*., amounting to 19*s*. 6*d*. The average number of sheep supported by one acre is calculated at eight, including the land that produced the hay and turnips for winter food, making the gross value of the wool per acre to be 7*l*. 16*s*. In scouring from the grease, this wool lost 11 lbs. in 20; and after being washed on the sheep's back, at least 7½ lbs. in 20 *.

There is an account, in the Agricultural Magazine for 1810, of "ten thousand Merino sheep being purchased by Sir James Stuart, and sent over to Ireland. They arrived in a very sickly state, and many hundreds of them perished; but enough were preserved for the most extensive breeding purposes." Little trace of the improvement effected by the Merino sheep is now to be discovered; but much more of the progressive value of the Irish flocks is to be attributed to the South Downs, and yet more to the Leicesters.

THE NEW SOUTH WALES SHEEP.

The British settlements in New South Wales (part of the eastern coast of New Holland) were originally intended for the reception of convicts, whose labour for a certain number of years, as a punishment for their crimes, might be rendered useful either to the free colonists or the mother country. The first party of them arrived at Botany Bay in January, 1788, whence they were soon removed to a more convenient situation at a little distance—Port Jackson. The climate, although its temperature in summer was considerably higher than that of England, appeared to be healthy. It had only one serious inconvenience,—that it was subject to periodical droughts, fortunately of unfrequent occurrence, but severe and lasting when they came. "The great drought which commenced in 1826, did not terminate until 1829. Very little rain fell during the whole of this period, and for more than six months there was not a single shower †."

The soil was exceedingly variable in different places. A considerable portion of it was very productive, but at least an equal part was comparatively barren. On the whole, it evidently promised well as a pastoral country. It had no sheep of its own, but a sufficient number were procured from Bengal to provide the colonists with mutton and wool, and to establish a permanent flock. They could be speedily obtained from that country, but they did not promise well. They had large heads, Roman noses and slouch ears; they were extremely narrow in the chest; they had plain and narrow shoulders; very high curved backs, a coarse, hairy fleece, and tremendously long legs ‡. This was an accumulation of bad

* Farmer's Mag., Aug., 1820. † M'Culloch's Dictionary, art. Sydney.
‡ Widowson's Present State of Van Diemen's Land, p. 142.

qualities. Yet such were the primitive New Holland sheep, more, according to Mr. Atkinson, resembling goats than sheep *, and from such animals emanated all the improved flocks now in the colony. The climate worked wonders upon them. New South Wales seemed to be an exception to the fundamental principle of the paramount influence of blood, and the more subsidiary one of soil and climate. In the first two or three years these sheep were, in a manner, changed; the hair was comparatively gone, and a fleece of wool, although of no great fineness, succeeded.

Shortly afterwards there were considerable importations of South Down and Leicester sheep, and the change was undeniably more important. Both the fleece and the carcase were doubled in value; but there was a limit beyond which they would not have much advanced. The colonists bred principally for the carcase. They did so more decidedly after the arrival of the South Downs and Leicesters than before, because the sheep rapidly assumed the roundness and compactness of form which is essential to early maturity.

The progress of the colony was nevertheless comparatively slow. In the year 1800, twelve years after the arrival of the first ship, there were but 6124 sheep in the whole settlement.

At this period, the Merinos were established in several parts of Europe, and had begun to gain footing in England. The colonists had long observed the influence of climate, or soil or management, on the primitive sheep of New South Wales. The hair had been changed for wool, and that wool had been yearly improving. The crosses with the South Down and the Leicester produced a fleece equal in fineness and value to that of the pure sheep of these breeds in the mother country. The colonists of Australia were therefore anxious to try how they should succeed with the Merinos. A few were imported from England, and the experiment was satisfactory beyond their expectation. The third or fourth cross with the then prevalent sheep of the colony produced an animal with a fleece equal to that of the pure Merino in Europe; and the wool of the pure breed seemed to improve as rapidly as that of the native breed had done. The colony now began rapidly to flourish. The number of voluntary settlers increased. The number of sheep, in the next three years, had risen to 10,157†; in 1813 they had increased to 65,121; in 1817 they were 170,420; and in 1828 they amounted to 536,391‡.

Captain M'Arthur, a zealous agriculturist, laid the foundation for still greater improvement. He reasoned, that if the fleece of the common Merino sheep became finer and softer on the soil, and under the climate of New South Wales, it was not improbable that even the Saxony wool might somewhat increase in value, and he imported some sheep direct from Germany. It would not perhaps be truly said, that the quality of the Saxony fleece was improved by the change of climate—perhaps it was somewhat deteriorated—but it soon became sufficiently evident that its properties were superior to any that the colony had hitherto possessed. They who were best capable of judging, and who could have no temptation to deceive—the wool-staplers and the manufacturers, shall here speak for themselves. Mr. H. Hughes, a Blackwell Hall factor,—"The qualities of the wool were originally very bad. Latterly they have been of varied qualities, but they all possess an extraordinary softness which the manufacturers here so much admire, and they are sought for more than any other description of wools. I should conceive that that country is adequate to the growth of as much wool of a fine description

* Atkinson's Agriculture of New South Wales.
† Collins's New South Wales, p. 549.
‡ Wentworth's New South Wales, p. 136.

as will ever be wanted by the manufacturers of England. This wool would also mix beautifully with our own wools, which other foreign wools do not always, on account of the harshness of the fibre *." In a second examination he says:—"There is no other wool which spins so well as the Australian, from its length of staple and peculiar softness. The finer description of stuff, which is now so much manufactured, is made of this wool. Whether from the climate or the herbage, or both, the wool has improved in softness and in staple too; and I have no doubt that we shall shortly derive the whole of our supplies of foreign wool from that part of the globe †." This is high praise, and the fulfilment of Mr. Hughes's prediction would be a consummation devoutly to be wished.

Mr. Donaldson, a wool-merchant, says,—"The Australian wools have much improved. They are decidedly preferable to the apparently slender description of German wools. From their superior softness of texture, they are better adapted than the other description of wools to mix with the harder staple of the English wools. They have comparatively very peculiar qualities. They have a softness and silkiness about them which, when worked into cloth, shows itself more distinctly than in the raw material of the same description ‡." Mr. Ebsworth says, that "the wool of Mr. M'Arthur has made some of the finest cloth that has ever been seen in this country §." One bag of Mr. M'Arthur's wool, weighing one hundred weight, and properly sorted, sold at the unprecedented price of 10*s.* per pound. It will, however, probably, appear by-and-bye, that the actual value of these wools has been somewhat exaggerated, and that although the exportation of them has rapidly increased, there are circumstances about these colonies and the woollen manufactures generally, which will ere long assign to them a limit which they cannot pass.

The principal complaint against the Australian wool used to be the dirty state in which it was sent to the market. This is now in a great measure remedied. One objection to New South Wales is the want of water; but where that is at hand, even greater care than in England is taken to cleanse the wool from all impurity. On two or three mornings previous to the shearing, the sheep are compelled to swim through some clear stream. They are likewise driven again and again through the river on the morning of the washing day itself, and made to stand dripping in the pen until they are wanted. In Captain M'Arthur's establishment, each sheep is dipped in a cauldron of warm water, previous to being washed, by which the grease and dirt are more effectually softened and separated from the fleece.

A place is selected in the river, where there is a sandy bottom, and a sufficient depth of water for the sheep to swim. The lower washer first gives the sheep a good rubbing, and passes him to the man above him; and after, that no impurity may be left, the animal is forced to swim a little way up the stream.

On the sheep the wool is shorn at one year's growth, and on the lamb at six months, which causes the Australian lamb's wool to bear so low a price, its staple being very short ‖.

The average weight of a fleece of superior quality is from 3 to 3½ lbs.; but fleeces of 5 lbs. are not uncommon; and some inferior, yet not bad fleeces, have weighed 7 lbs ¶.

Dr. Lang, however, states the average to be from 2 to 2½ lbs. per sheep **.

* Evidence before the House of Lords. † Ditto. ‡ Ditto. § Ditto.
‖ Cunningham's Two Years in South Wales, vol. i. p. 253.
¶ Breton's Excursions in New South Wales.
** Lang's Historical and Statistical Account of New South Wales, vol. i. p. 351.

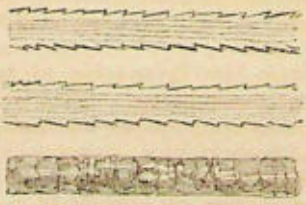
The increased exportation of wool is a satisfactory proof of the growing estimation in which it is held.

In 1810 it was only 167 lbs.; in 1820 it had increased to 99,415 lbs.; in 1821 it was 175,433 lbs.; in 1822, 138,498 lbs.; in 1823, 477,261 lbs.; in 1824, 382,907 lbs.; in 1825, 323,925 lbs.; in 1826, 806,302 lbs.; in 1827, 320,683 lbs.; in 1828, 967,814 lbs.; in 1829, 913,322 lbs.; in 1830, 973,336 lbs.; in 1831, 1,134,134 lbs.; in 1832, the quantity of New South Wales and Van Dieman's Land wool amounted to 2,377,057 lbs.; and, in 1833, to 3,516,869 lbs*.

The increase, in one year, of 1,139,812 lbs. shows the prosperity of the colonies, and the improvement of the wool; but when during the same year the increase of the importation of wool from Germany was 5,537,881 lbs., it must be confessed that it gives little prospect of the speedy arrival of the time when the Australian colonies will supply the mother country with the full quantity of fine wool that she requires. The market price in March, 1834, was 5*s.* 5*d.* per lb. for the best Saxon wool, and 4*s.* 6*d.* for the best Australian: while this proves that the wool of New South Wales has become more valuable than that of the Spanish Merino, which reached only 4*s.*, it does not promise that complete victory which, according to Messrs. Hughes and Donaldson, was to be gained over every competitor. Indeed, such a victory as this is not to be expected. Sheep cannot be kept in right condition, nor the quality of the fleece preserved from deterioration, without a great deal more care than is bestowed upon them, or can be bestowed, in these colonies. The very paucity of the inhabitants will put a limit to the growth of wool very far short of a full supply. In addition to this, it may be asked, if this supply could be obtained, and the immense importation from Germany continued as much at our command as it is at present, what price would fine wool fetch, or how could it pay the Australian grower? The present result, however, is highly pleasing, and there can be no doubt that Australia will, ere long, become one of the most valuable of the British foreign possessions: but it requires, and it deserves, far more assistance and encouragement than it has hitherto received from the mother country.

The microscope very satisfactorily illustrates the character and actual value of these wools.

A fibre of fair, but not very superior, Australian wool, was subjected to its power.



1. *Transparent.* 2. *Combed.* 3. *Opaque.*

It proved (see 1.) to be (when viewed as a transparent object) $\frac{1}{7}\frac{1}{5}$th of an inch in diameter, and the number of serrations were 1920 in the space of an inch. It was therefore coarser than the Saxony wool, which was only $\frac{1}{8}\frac{1}{0}$th part of an inch, and it was of precisely the same diameter as the picklock Merino. It was decidedly inferior to both in the number of serrations—the Saxony presenting 2720, and the picklock Merino 2560: but the edges were definite, although not projecting much, and some of

* M'Culloch's Dict., art. *Wool*; and Widowson's Van Diemen's Land, p. 50.

them were very sharp, and even hooked, accounting for its felting property. When viewed as an opaque object (3.), the cups were placed at regular distances, with evident development of the Vandyke structure, but the Vandykes small, and far from being thickly set; thus, probably, being more pliable, and accounting for the peculiar softness described by Messrs. Hughes and Donaldson. The combed wool (2.) was then examined: its edges were tolerably preserved, and even some of the sharp barbs, thus corresponding with its acknowledged properties as a combing wool.

Through the kindness of Mr. Symonds, the author had the opportunity of examining another specimen of New South Wales wool, which was selling in the British market (in September, 1835) at 2*s.* 6*d.* per lb. When viewed as a transparent object (1.), it also was the 750th part of an inch in diameter, and the serrations were 2080 in the space of an inch. As an opaque object (2.), the structure of the cups was well developed. It consisted of a few broad leaves, diverging from each other towards the apex, and affording each other little support at the base. It was easy to imagine that a cup or joint like this would be flexible to a very considerable extent.

New South Wales Wool.

1.



2.



1. *Transparent.* 1. *Opaque.*

M'Arthur's Wool.

1.



2.



1. *Transparent.* 2. *Opaque.*

To the same gentleman we are indebted for a sample of M'Arthur's Australian wool. The cuts of this and the preceding wool are placed together on account of the singular difference in the structure of the serrations or cups, and beautifully corresponding with the manufacturing properties of each.

The serrations (1.) were 2400 in the space of an inch—they were very sharp, and in appearance almost barbed. The fibre was $\frac{1}{750}$th of an inch in diameter. When viewed as an opaque object (2.), the leaves of the cup were unusually long and finely pointed, giving the idea, not only of a good felting wool, but of a flexible one. The leaves of the cup or joint would readily entangle with each other, on account of their sharpness and their length—and being so narrow as they are, and even towards the base, they would readily bend.

But these are not the wools that Mr. Hughes' account of them would lead one to expect: there is, even in the two inferior samples, sufficient to account for their peculiar softness. There is in the construction of the cup a singular difference, evidently marking the different origin of the sheep from which the samples were taken; and there is also—(is Mr. Hughes right in his assertion, that 'the climate, or the herbage, or both, have been exerting their influence'?)—a marked difference, not only in the length but in the structure of the Saxon wool, as obtained direct from

Germany and imported from Australia. The fibre of the Australian is considerably longer, but it is not so fine—the serrations are not so numerous—they are of a different character, seemingly giving pliability and softness to the one, and feltiness to the other. (see pp. 89 and 90.)

In truth, the manufacturer has properly distinguished and classed them, although he knew nothing of their microscopic appearance. He has appropriated the true Saxony wool to the making of the finest cloth—he has availed himself of its superior felting quality; and he is using the Australian wool for the better combing purposes, in which a strong tough wool, soft and long in the staple, is useful.

The wool is packed in bales, wrapped in canvass, and forwarded to Sydney, where it is sorted by the merchants, and repacked for exportation; but some of the larger sheep-farmers send their wool direct to their agents in London.

Sheep-farming now constitutes the chief employment and dependence of the New South Wales colonist. Some of these persons possess 15,000 or 20,000 sheep. These are divided into separate flocks, more or less numerous, according to the nature of the country and the pastures. Where the land is literally plain and cleared of timber, a thousand sheep are sometimes put under the charge of one shepherd and his dogs. Where there is much wood or irregularity of surface, 350 sheep are deemed quite as many as one shepherd can properly take care of. The sheep are led out to graze before sunrise, and folded, or brought back to the sheep-yard at night, but they are never housed. This is very different from the treatment of the Saxon sheep, with which they are now, and not altogether unsuccessfully, competing.

The work of the shepherd—usually a convict—is therefore very severe, especially in the more sterile parts of the colony, where three acres of the uncultivated ground are scarcely sufficient for the support of one sheep.

The principal enemies that the sheep have to fear are the wild dogs, which are numerous in some parts of the country, and will sometimes attack the flock in the open day. The wall of the sheep-yard is too high for them to overleap at night; and the hurdles for the fold are made of light swamp oak, or slight iron rods seven feet in length, which are placed so close that the lambs cannot escape, nor the dogs enter. A watchman, with his dogs, has a moveable weather-tight box, in which he passes the night close by the fold, and near to which he kindles a fire, as well for his own comfort, as to scare away the wild dogs*.

There is another more crafty and dangerous foe in the runaway convict, who, in the interior and wilder parts of the colony, has his retreat usually well stored with the mutton stolen from the neighbouring flocks.

The pernicious system of breeding too early is general; and it is not an uncommon occurrence to see a ewe, not a twelvemonth old, with a lamb at her feet, and the mother and her progeny, of course, half starved†. The old and toothless wethers and ewes are seldom draughted from the flock, on account of the false impression, that, as the animal grows old, the wool becomes more valuable. It may be finer, but it is a sickly thinness of fibre which it acquires, and it has lost the greater part of its original soundness. These poor animals are suffered to crawl after the flock, until they are worn out with age and infirmity.

The ewes are put to the ram in January, the midst of the summer in New South Wales. The reader scarcely needs to be informed that the

* Cunningham's Two Years in New South Wales, vol. i. p. 251.—Lang's Historical and Statistical Account, vol. i. p. 349.

† Widowson's Van Diemen's Land.

seasons are reversed in that part of the world. The spring commences in September, the summer in December, the autumn in March, and the winter in June. The lambs are therefore dropped about the middle of the mild winter of that colony, and are ready for the first flush of the grass in the spring *. There is, however, some variation in this: a few of the sheep-masters contrive that the lambing season shall be at the beginning of summer †; and others, more absurdly, endeavour to procure two sets of lambs in one year, or at least in fourteen months ‡.

The sheep in New South Wales appear to be nearly exempt from most of the maladies to which these animals are exposed in Europe; but to the *foot-rot* they are lamentably subject. Although there is a general complaint of want of water, and there are, occasionally, long seasons of drought, yet the sheep frequently suffer from the wild and poachy nature of a considerable portion of the pasture. The foot-rot seems to assume a character of its own in New South Wales. In an early stage it is easily managed, if the knife and the caustic—the butyr of antimony far beyond all other caustics—are skilfully applied; but if neglected, it speedily becomes inveterate, and preys upon and destroys the animal. The losses occasioned by it in the early existence of the colony were frightful.

Next in order, whether the frequency or serious results of the disease are considered, stands "the scab." This too is manageable in an early stage. An ointment, composed of one part of strong mercurial ointment, and five of lard, well rubbed together, will speedily get rid of it; but if it is neglected in the early stage, the irritation which it occasions wears out the animal.

Dr. Lang says, that "when a convict-shepherd has a pique against his master, or even against his overseer, it is often in his power to subject the whole of his master's flock to this obnoxious disease, merely by driving his own flock a few miles from their usual pasture, and bringing them into contact with a diseased flock." He well remarks that "the chief source of the wealth and prosperity of the colony is thus, in a great measure, at the mercy of the most worthless of men §."

WESTERN AND SOUTHERN AUSTRALIA.

Stimulated by the success of the colony on the eastern coast of New Holland, another has been established on the western coast. It takes its name from the river—the Swan River—on the banks of which its principal settlement was placed. The main hope of these colonists likewise depends on the successful cultivation of sheep; and though the establishment is yet in an infant state, some fine samples of wool have already found their way to the British market. One of its advantages, so far as they can be at present ascertained, is the evident superiority of the soil. In some parts of the colony on the eastern coast, it has been stated that three acres of land are scarcely sufficient for the keep of one sheep; but, in almost the whole of the country on the banks of the Swan River, two or three sheep may be kept on every acre. It is also said, that on the western coast a settler can much more quickly and perfectly bring his farm into a state of cultivation, on account of the more open state of the country; and not only on the banks of the main river, but in the inland country there is plenty of water ||. Time will determine the relative value of these colonies.

On the southern coast of New Holland, a third colony has lately been established, under the title of "Southern Australia," and extending from

* Widowson's Van Diemen's Land. † Lang's Historical Account, vol. i. p. 348.
‡ Widowson's Van Diemen's Land. § Lang's Historical Account, vol. i. p. 351.
|| Fraser's Picture of Australia, p. 325.

Fowler's Bay to Cape Northumberland, but there has not yet been sufficient time for it to work.

THE VAN DIEMEN'S LAND SHEEP.

Separated from the southern promontory of New Holland by a narrow strait is Van Diemen's Land, so called from the name of the governor-general presiding over the Dutch settlements in the East Indies when the island was discovered. The British government, observing the success of the colony at Sydney, resolved to form a new establishment on the southern coast of New Holland, to which the worst description of the convicts from England might be sent, and also those who had been guilty of serious offences at Port Jackson. Two ships sailed from England in the spring of 1805 for this purpose. Their destination was Port Philip, which they reached in the autumn of the same year; but it was speedily found that the want of water and other circumstances would render it impossible for a permanent colony to be established there, and the vessels proceeded to the mouth of the river Derwent, in Van Diemen's Island. This situation seemed to be peculiarly eligible, and the capital of the new settlement, Hobart Town, was soon afterwards built.

The climate of Van Diemen's Land is much more temperate than that of New South Wales. It is equally free from the occasional drought of New Holland, and the humidity of the mother country*.

In 1807 sheep were first introduced there. They came from India, and from Norfolk Island, and were of the same character as those that had been formerly conveyed to New South Wales. Afterwards, Colonel Paterson, who had established himself more on the north of the island, imported some of the Teeswater sheep; but the progress of improvement was slower in Van Diemen's Land than in New Holland; and the settlers were often exceedingly annoyed by gangs of bush-rangers, or runaway convicts.

It was not until after the year 1820 that the cultivation of fine wool may be said to have been established there. Lieutenant-General Sorrell, who was governor of the colony, entered into an arrangement with Capt. M'Arthur, who agreed to part with 300 Merino lambs, for the use of the colony at Van Diemen's Land. They were sent to Sydney, and embarked on board a government vessel; but, the ship being detained a considerable period at Sydney, a distemper broke out among them, and ninety-one died there and on the passage, and twenty-eight more were lost soon after they were landed; so that only 181 of them remained. These were valued at seven guineas each; and in September, 1820, were distributed among the settlers in the neighbourhood of Hobart Town, in proportions regulated by the governor, and depending on his opinion of the agricultural skill and trustworthiness of the colonists. No money was demanded at the time; but security was given for the payment of the sum, at a certain after-period, when the settlers might have begun to have reaped the advantage of the speculation†.

Some years afterwards, Mr. Gilles of Merton Vale did more benefit to the colony than all the united attempts of the older settlers, by introducing the pure Saxon breed direct from Germany‡. The competition between the two colonies now commenced; and whether it was that the Van Diemen's Land settlers were so much later in the field, or the climate of that island is not so favourable to the growth of fine wool, the fleece does

* Widowson's Van Diemen's Land.
† Bischoff's History of Van Diemen's Land, p. 44.—Biggs's Report, Jan. 1823.
‡ Widowson's Van Diemen's Land, p. 143.

not fetch so high a price in the market as that from the sheep of New South Wales.

The following is a cut of some lamb's wool from Van Diemen's Land. It is inserted not only to afford idea of the nature of the wool grown there, but on account of its great singularity.

Van Diemen's Land Lamb's Wool.



1. *A fibre of it viewed as a transparent object.*
2. *Ditto as an opaque object.*

When viewed as a transparent object (1.), its diameter was about $\frac{1}{7\frac{1}{2}\frac{1}{0}}$th part of an inch, and its serrations were slight, in some places indistinct and very irregular. It had more the appearance of a combed wool than of the natural fibre.

As an opaque object (2.), it was difficult to assign any distinct character to it. After long and almost painful observation, the cups could be distinguished, but the fibre seemed to be enveloped in a woolly exterior, which gave it the character of a vegetable substance in a state of decomposition. How this may tally with its use the manufacturer must determine.

The quantity of wool imported from Van Diemen's Land has rapidly increased. In 1827, 192,075 lbs. were shipped for England; in 1828, 528,845 lbs.; in 1829, 925,320 lbs.; in 1830, 993,979 lbs.; in 1831, 1,359,203 lbs.; in 1832, 951,131 lbs.; and in 1833, 1,547,201 lbs.*.

Of the number of sheep at Van Diemen's Land, it is impossible to form a calculation. There are probably between 700,000 and 800,000; but the embarrassment of many of the settlers, and the wish to swell the amount of their property, as well as to entitle themselves to a share of the supply required for the King's stores, all operate to give a delusive character to their returns. In the amount of the wool imported into England, there can, however, be no mistake †. The number of sheep belonging to the Van Diemen's Land Company, and whose accounts were accurately kept, in 1810, were only 3070, but they had increased in 1821 to 170,391. They were multiplied sixty-fold in eleven years‡.

The system of sheep-management is nearly the same, except that the flocks are smaller. Mr. Widowson is of opinion that not more than 300 should run in one flock. "I have frequently watched," says he, "a flock of sheep of a thousand feeding, or rather trying to feed; the wethers, or strongest ewes, always leading the flock, rushing on continually before the rest, and leaving the weaker ewes to browse on the grass they have soiled." There are a greater portion of hired shepherds and other servants at Van Diemen's Land than at New South Wales §.

* Bischoff's Van Diemen's Land, p. 50.—M'Culloch's Dictionary, art. Wool.

† Bischoff's Van Diemen's Land, p. 42.

‡ Widowson's Van Diemen's Land, p. 103. Bischoff calculates the live stock in Van Diemen's Land to have consisted, in 1830, of 665,000 sheep, 113,000 cattle, 2805 horses, and 1090 goats.

§ Widowson gives a curious account of the frequent mode of hiring the shepherds. He says that "a young man going out with letters of recommendation from the clergyman of the parish, or some influential person, will generally find employment soon. Sheep are intrusted to him on *the thirds* by those who are the proprietors of many flocks; or whose other engagements will not allow them to give personal attention to their sheep. The arrangement generally entered into is this:—A. agrees to give B. 400 ewes on *the*

The general system of management is the same as in New South Wales, except that the baneful practice of suffering the ewes to breed twice in fourteen months is more generally followed.

The sheep are even less subject to disease in Van Diemen's Land than in New South Wales; and the foot-rot, which is so destructive in the latter, is scarcely heard of in the former. The system of raising artificial food has been introduced into Van Diemen's Land, but not to so great an extent as at Port Jackson, because the soil is more productive, and there is a greater quantity of natural herbage in every season of the year.

Chapter VI.

A CHRONOLOGICAL HISTORY OF THE BRITISH SHEEP AND WOOLLEN MANUFACTURES.

Some writers have doubted whether the sheep is indigenous to Britain. They state that the old natural historians, and the writers on agricultural subjects, who describe the various kinds of sheep in Asia and in Europe, make no mention of these animals as existing in Britain *. The natural reply to this would be, that they are equally silent as to the sheep of the greater number of the uncultivated people of these times; and that if it is to be concluded that an ancient and rude nation was not possessed of certain animals, or certain conveniences of life, because these things are not mentioned by the historians of that day, a very erroneous estimate would be formed of their comforts, habits, and occupations.

It is also said that the trading of the Phœnicians with the Britons in lead and tin is recorded by several writers, but that there is no mention of sheep or wool as articles of commerce. The answer to this would be, that these early voyagers traded with the inhabitants of the remote west for those commodities alone which their own country, or the countries bordering upon them, did not produce; and that Phœnicia was in the neighbourhood of the districts inhabited by the primitive flocks, where the sheep and wool were most cultivated, and in the highest perfection. It was not likely that they would pay much attention to an article then little cultivated in Britain, because little used, and of the real value of which they had not the means of judging. It is, however, mentioned, that the skins of animals—the oldest species of barter, and practised in the very dawn of society—did form a part of their commerce; and it is not improbable that the skins of sheep constituted a portion of the freight †.

The Britons, in that early time, were sailors. They had little canoes in which they explored the creeks and harbours of their indented coast. These boats or coracles were made of wicker-work, that they might live where heavier vessels would be in danger of being dashed to pieces; and

thirds; A. providing rams also, which are his individual property. B. becomes responsible for the original number of sheep, excepting such as are lost by disease or accident. At the time agreed on the produce is divided, and one-third of the lambs becomes the property of B. Generally speaking, the party to which the flock belongs prefers the wether lambs; but as it is very much to the advantage of the other party to procure as many females as he can as the foundation of his own future flock, this arrangement is not objected to."

* *Chronicon Rusticum Commerciale*; or a History of British Wool, by John Smith, *passim*. This work, although not without its faults, is exceedingly valuable, and may be generally depended upon, except in the very early part of his history.

† Maurice's Commerce of the Britons, in his Indian Antiquities, p. 302.

the wicker-work was covered with the skins of animals that had undergone some process of tanning, and that varied in size and weight, and had probably been taken from different subjects, according to the capacity of the boat *.

The reed-built huts of the Britons were likewise covered with skins similarly prepared.

It is true that Cæsar, who describes the habits and manner of life of the Britons very circumstantially, makes no mention of the sheep, or of the employment of its wool as connected with any article of clothing; and therefore Speed gives it as his opinion, in his "Chronicles," that "the use of the wool detached from the sheep was quite unknown to the Britons, who, when they were clothed at all, were clothed only in skins.†" It is well known, however, that at that period the Gauls, between whom and the Britons there was much intercourse, and whose habits were much alike, possessed the art of manufacturing a kind of cloth or felt, without spinning or weaving, sufficiently strong to resist the stroke of a sword.

It was only when engaged in war that the Britons went almost naked, and painted and punctured their bodies in order to terrify their foes. When at home and at peace, they were clothed with the skins of beasts, and lived upon milk and flesh. Milk was one of the earliest articles of food in every ancient and uncivilized tribe; and the use of the milk of the sheep preceded that obtained from cattle by very many centuries in all these hordes. Therefore, and as no historian mentions the introduction of the sheep into Britain, it is probable that it existed in that island from a very early period; and in that state of domestication in which it was found among other nations long before the subjugation of the ox ‡.

In the year fifty-five before Christ, Cæsar first landed on the coast of Britain; but it was not until more than a century afterwards that this island could be said to be completely subdued under Agricola.

The conquest of the island being effected, the Romans, as in every country in which their arms prevailed, directed their attention to the civilization and improvement of their new subjects, and, among other things, they established a woollen manufactory at Winchester. Whence came the material? Was it furnished by the flocks of Italy or of Spain? Historians say nothing of this; nor was the commerce of the Romans sufficiently advanced to enable them to bring from a distance a sufficient supply of wool.

No historian makes mention of the importation of sheep into the British islands by its conquerors; although that would have been a boon which many a writer would have celebrated. No! the factory was supplied from a native source; from that fleece, the value of which the uncultivated

* See Maurice, as before.

† It is curious to trace the predilection to the use of skins even to modern times. George Fox, the quaker, in the reign of Charles I., is said to have travelled in his apostolic missions, buttoned up in a leathern doublet or waistcoat with sleeves, and which supplied the place of a coat. The common dress of the labouring mechanic, not a century ago, consisted of this leathern doublet; and the buckskin breeches of the sportsman are still worn.

‡ Hardyng, in his Chronicles, seems to illustrate this. He is describing the daughters of Danaus, when they first landed in Britain. Albyne, the eldest daughter, gives to her sisters

"arrows and boltes,
To slee the *dere*, the *bull*, also the *bore*,
The bear, and byrdes that were therein before.

And they, "with pitfalles and trappes, begil the beastes, and byrdes, and fyshe to their sustenance." Nothing, however, is said of the sheep; he was already a domesticated animal, when all the rest were wild.

Britons, clothed only with skins, had not discovered, but which was at once manifest to their conquerors.

It was, doubtless, principally established for the supply of the Roman army with clothing; but it was not long confined to this. Some of the fabrics reached Rome; and they were so highly appreciated, that during the continuance of the Roman domination, and in the most luxurious era of the empire, the finest and most expensive robes—those used only on days of festivity or ceremony—were furnished by the British factories. One Roman writer, Dionysius Alexandrinus, uses the following language, as quoted by Hollinshed, and strongly expressive of the value of the material: "The wool of Britain is often spun so fine, that it is in a manner comparable to the spider's thread *."

It would be pleasing to know what kind of British wool was used in the first manufactory, although this would not decide the question as to the primitive breed, nor whether there was any breed to which this distinctive name could be applied. Possibly, as now, there were different breeds, suited to the soil and produce of different districts. The account just given of the material has been said by some persons to leave little doubt as to the breed that was first selected. "The wool was spun so fine as to be in a manner comparable to the spider's web." It was the long wool, that which, at the present day, as fifteen hundred years ago, stands unrivalled in the world as a combing and spinning wool; and it has been added, that, as old usages are not often forgotten, and old-established manufactories do not often change their fabric, there are still many factories of fine worsteds in the immediate neighbourhood of Winchester, and that can scarcely be excelled in the kingdom. The situation of the first factory leads, however, to a different conclusion. Winchester is in the very heart of the short-woolled country, a country, in fact, that would support no other breed of sheep. It is surrounded by the Westdown sheep; it has the Dorsets on the west, the Wiltshires on the north, and the Southdowns of Sussex on the east. The short wool was the only material that could be procured without difficulty there, or that could be procured at all. It was the short wool that was used in this first manufactory, and, the art of fulling not being carried to the perfection to which it now is, the threads were plainly seen, and their comparative fineness could be ascertained. It may be added that factories of short woollen goods have been established there from time immemorial, and that the first guild of *Fullers* was chartered at Winchester.

Whether other manufactories arose, or how long this maintained its high reputation (it never became defunct), or what change, and how soon, was effected in the clothing of the natives, or the cultivation of the sheep, are subjects with respect to which history is silent. A chasm, unexampled in the records of any other country, succeeds. In the distractions to which Britain was subject for 600 years, it may well be supposed that the art of manufacturing cloth, like every thing else, fell into comparative decay. It was not, however—it never could be—altogether lost. Notwithstanding the general inattention of our early writers to the state or the progress of the useful arts, we are still able to collect a few scattered hints, which lead to the conclusion that the preparation of wool for its manufacture had become, in very early times, a favourite employment of the Britons, both in the higher and inferior situations of life; and that the superiority of the wool, and of the fabric procured from it, was perfectly appreciated, and considered as the foundation of our national prosperity †.

It is not, however, until the year 712, that, after the expulsion, or retire-

* See Anderson on Commerce, vol. i.

† Appendix, No. 4, to the Report of the Highland Society, p. 39.

ment of the Romans, the sheep is expressly mentioned; and then it is merely stated that the price of the animal was one shilling until fourteen nights after Easter*. This shilling of Saxon money was about equal to five pence of the present currency, there being forty-eight Saxon shillings in the pound; and, taking into account the different value of money, and the different expense of living, would be equivalent to twenty times that sum, at the present day.

Another interval of 160 years passes, and then the mother of the noble Alfred is described as being skilled in the spinning of wool herself, and busied in training her daughters to the same employment †.

It is generally believed—and the ground on which the statement rests is somewhat more certain than the propensity to attribute to this patriot-monarch every thing that is dear to us as Britons—that, among the various arts which he encouraged, the woollen manufacture stood one of the foremost.

Forty years afterwards, we have another pleasing picture of the domestic arrangements of some at least of the higher classes, and the universal attention to the uses and manufacture of wool. Edward the Elder died. He had children by three wives, the first of whom was named Egwina, and was a shepherd's daughter. Speed explains this. She was the daughter of a gentleman, perhaps a country gentleman, but not a soldier, and therefore, in the language of the court, called a shepherd. They who were not devoted to a military life were supposed to be employed in the breeding of sheep. Here is a satisfactory illustration of the general attention which was now paid to this branch of husbandry—this source of national wealth ‡. Smith adds, that we are not to measure the grandeur or delicacy of the court of that day by present appearances and manners, for, in Fabian's Chronicle, p. 179, it is remarked of this same King Edward, that, being careful that his children should receive a proper princely education, "He sette his sons to scole, and his doughters he set to woll werke, taking example of Charles the Conquesterer."

The very name by which unmarried women in England are designated —spinsters—is a proof at once of the antiquity and universality of this mode of employing time; and also of the extent to which the sheep was cultivated, for the flocks must have been numerous and large, to have given employment "to the unmarried women of all classes," as Bayley has it in his Dictionary, "from the daughter of a prince to the meanest person."

* Stillingfleet's Chronicon Pretiosum, p. 50.

† Alfred, if the Chronicle of Robert of Gloucester is to be believed, had reason to love and reverence her.

> "King Alfred was the wysest king that long was byvore;
> Lawes he made—right all ones, and strongore than er were.
> Clere he was, God yknow, and yet as one telleth me,
> He was not lesse than ten yere old er he couthe ys abece.
> And his gode mether ofte smal gyftes to him she kindly toke,
> Vor to leve other ple, and loke upon his boke."
>
> Gentleman's Mag. 1834, p. 596.

The story on which these monkish rhymes are founded, is thus related by Asser. "Though he had reached the age of twelve before he acquired an art then so rare as that of reading, he was delighted with listening to the Anglo-Saxon songs. Judith, his mother, holding in her hands a volume of these poems, in which the beautiful characters pleased her husband's children, said to them, 'I will give it to the one among you who first learns to read it.' 'Will you?' eagerly asked Alfred, although the youngest. 'Yes,' said she, with a smile of pleasure. He suddenly snatched the volume out of her hands, and running to a schoolmaster, returned no more to his home until he was able to read and recite it to her."—Mackintosh's History of England, vol. i. p. 37.

‡ Chronicon Rusticum:

The antiquity of the word is beyond the limit of any record or traditional account of its origin *.

The bones of many wild animals have been discovered in various parts of England; and soon after this time, it appears that the country was overrun with wolves. The civil wars, and foreign invasions which so rapidly succeeded to each other after the death of Alfred, engrossed the whole attention and care of the people; and the vigour of the West Saxon government expiring with Athelstan, the son of Alfred, these ferocious beasts were suffered to multiply so fast, that travelling, at least in the night, became dangerous; and houses were erected in the midst of some of the forests, in which the traveller might rest in safety until the morning—although, as in other countries infested by wolves, there can be no doubt that proper means were taken, in the form of sheep-yards and folds, and the courage and fidelity of the British dog, even then celebrated in distant countries, in order to protect the sheep during the night. The wolves were probably the source of much annoyance and loss to the sheep-breeders. Twenty years afterwards, however, the warlike Edgar, having obtained possession of the whole of the Anglo-Saxon country, determined to extirpate these quadruped foes. His plan was a politic and a successful one. He commuted a portion of the tribute for a certain number of wolves' heads, and, before three years had expired, not one of these animals remained in the whole of his dominions †.

It would be imagined that the cultivation of the sheep, and the progress of the woollen manufacture, would meet with no farther hinderance; and, from notices which occur a great many years afterwards, there is reason to conclude that much attention was bestowed on them, and that they were fully recognized as the sources whence the monarch drew a considerable portion of his tribute, and the foundation of the general prosperity and wealth of the kingdom. The historians of those days, however, had more marvellous things to occupy their attention.

De Witt, the Grand Pensionary of Holland, states, that about the year 960, or somewhat earlier, the woollen manufactory was established in Flanders. He says, that "the Flemings lying nearest to France were the first to earn their living by weaving. Baldwin III. assisted in this by appointing certain fairs, or markets, where the material and the manufactured fabric might be bought and sold free of duty. Some sort of woollen cloth must have been made in all countries emerged from barbarism." There is considerable doubt, however, whether the Flemings at this time—eminent as they afterwards were for their manufactures—were any thing more than merchants ‡.

The price of the sheep remained unaltered; for, in 1000, in the reign

* Report of the Highland Society, App. No. 4, p. 50.

"To spin with art in ancient times was seen,
Thought not beneath the noble dame or queen;
From that employ our maidens took the name
Of spinsters, which the moderns never claim."

Brit. Farmer's Magazine, 1830, p. 436.

† They were still occasionally found in the mountains of Wales; and the last was destroyed in Scotland in 1680, by Sir Edward Cameron of Lochiel.

Fynes Morrison, in his Itinerary, mentions the depredations committed on cattle in Ireland by the wolves. In the winter nights they sometimes entered the villages and the suburbs of the cities. This continued until the beginning of the eighteenth century. It is said that the last wolf seen in Ulster was shot by Arthur Upton of Aughnabreack, on the Wolf-hill, near Belfast; and the last of these animals seen in Ireland was killed in 1710, in Kerry, on the Croay River, near Glenarm.—Gentleman's Magazine, 1834, p. 149.

‡ Anderson on Commerce, i. 46.

of Ethelred, it was determined that, if a sheep was accidentally or wilfully destroyed, the compensation should be one shilling of Saxon money *.

In 1041, at the accession of Edward the Confessor, a pestilential epidemic prevailed among cattle and sheep, which destroyed the greater part of them. The supposed cause of it is not stated †.

Another and even more destructive one occurred in 1125, in the reign of Henry I., and which also swept away many thousand human beings ‡.

In the early days of the Norman kings, when woollen manufactories were established in many parts of the kingdom, the cloth was made of British wool alone, and which was then highly esteemed for its fineness and clothing quality. The short wool therefore was in extensive requisition, for of that alone could these broad cloths be made, and the long wools were employed for hosiery and woollen goods. The value of both breeds of British sheep was now understood and acknowledged.

These cloths were also dyed of various colours, and in a very superior way.

The price of the sheep remained unaltered for a considerable time. In the year 1100, at the accession of Henry I. to the throne, and when he wanted money to enable him to resist the juster pretensions of his brother Robert, he offered to take a portion of his tribute in kind, and a sheep or a ram was reckoned at about 13*s.* of the present value of money. Many years afterwards, and towards the close of his reign, when this system of paying the taxes in kind seemed to be established, forty sheep were equivalent to as many pounds; or the price of the sheep had risen to 20*s.* §; and fifty years after that, in the reign of Henry II., the price had risen to 25*s.* (present value), for the tenants of Shinborn (Sherborne) were each compelled to pay that sum or a ram towards the support of the church ‖.

In 1140, the fifth of King Stephen, the woollen manufactory was in so flourishing a state in many of the large towns, that the merchants petitioned the King for power to form themselves into distinct corporations or *guilds*, governed by such regulations and laws as they might deem expedient for the especial protection and furtherance of their trade. It comes not within the scope of the present work to inquire into the policy or the justice of these combinations. In many cases, and especially in an early and comparatively rude state of society, they might be productive of advantage to that particular trade whose members were combined together; but they were easily made the engines of monopoly and oppression. The difficulties which the members of these guilds threw around an admission into their fraternity—the fees they exacted—the power they frequently exerted of preventing all who did not belong to their company from engaging in the same business, at least in the neighbourhood of the guild—and the long

* There is a curious record as to the comparative value of the different domestic animals at that period. By an agreement between Ethelred's commissioners and those of Wales, it was arranged that the value of strayed cattle should be thus computed:—A horse, 30 shillings, or 150 pence, there being at that time 5 pence to the shilling; an ox, 30 pence, or 5 shillings, being only one-sixth of the value of a horse; a swine, eightpence; a sheep, one shilling, or 5 pence, and a goat, 2 pence.—Anderson on Commerce, i. 99.

It has been calculated that the price of these things, or the expense of living, was then only as 1 to 20, supposing that the value of money at this late period of the Saxon domination was the same as under the first Norman monarchs. It is also observed, that the sheep, whether compared with the ox or the swine, is proportionally dearer than either of them. This circumstance is easily accounted for when the value of the fleece is recollected, and which had been devoted to manufacturing purposes.

† Chronic. Saxonic. An. 1041.

‡ Chronic. Saxonic. An. 1125.

§ Chronicon Rusticum, in loc.

‖ Chronicon Rusticum, in loc.; and Stillingfleet's Chron. Pretiosum, do.

and expensive apprenticeships which were required—might be, and often were, exhibitions of cruelty and tyranny, such as the monarch himself scarcely dared to attempt. As the true principles of trade became better known and practised, the power of these guilds was curtailed. Many of them gradually became social and charitable, instead of political bodies; and the time will arrive when they will no longer be permitted to possess any special immunities that tend to obstruct a free competition in business*.

The manufactory originally established in Winchester still flourished, although eight or nine hundred years had now passed away; for it is said that the weavers of wool paid "one mark of gold (2*l.*) annually, equal to 30*l.* at present, to have their customs and liberties, and right to elect the aldermen of their guild†."

Had there been any doubt that the manufacture of the short clothing wool was that which was originally established, it would now have been cleared up; for it is added that the *fullers* of Winchester, the birth-place of the manufacture of wool in Britain, likewise applied to be elected into a separate guild, for which they paid 16*l.*, at least equal to 240*l.* at the present day, annually ‡. The British short-woolled sheep are no animals of yesterday's importation; but, from the earliest period in the history of the commerce of the island, are intimately connected with the national prosperity.

It appears that, at the same time, the cloth manufactory existed and flourished in other parts of the kingdom, for the weavers of Oxford paid a mark of gold for their guild, and the weavers of London 16*l.*

Were other proof wanting of the flourishing state of the woollen manufactory at this period, it might be added, that in the same year, 1140, "the men of Worcester pay 100 shillings, (equivalent to 50*l.* of the present money,) that they might buy and sell again wool, as they were wont to do in the time of Henry I. §" It appears from other circumstances, that this was all British, and not foreign cloth; and the quantity must have been very great, when the dyers of one town, and that of no great magnitude, could afford to pay such a sum for the recovery of a lost privilege of this nature.

In the records of the Exchequer for 1150, there is an opportunity of comparing the opulence or estimation of the guild of woollen manufacturers with that of another trade. The annual tribute of the guild of the weavers of London is lowered to 12*l.* (180*l.*); and that of the *bakers* of the same city—a numerous body, as providing the principal article of food—was set at 6*l.* (90*l.*) ‖.

The woollen manufacture must have been extensive and valuable, and conducted on scientific principles, when divided into these distinct departments; and the subordinate one attaining to such a magnitude as to be elected into a separate guild.

In 1172, a circumstance of much importance in the history of the British woollen manufacture, and which has already been alluded to, occurred. Henry II. expressly ordained by statute, that Spanish wool should not be mixed with English wool in the making of cloth—broad cloth and that of a fine quality ¶. One object of this enactment probably was, that the importation of foreign wool should not lower the price of that of native growth, and thus interfere with the interests of the British sheep-master. It was the first of those absurd prohibitions which more correct views of

* See some excellent observations on these chartered bodies in M'Culloch's Dict., Art. Corporations.

† Madox's History of the Exchequer, p. 332.

‡ Do. § Do. p. 286. ‖ Do., p. 250.

¶ Anderson's History of Commerce, p. 189.

commercial and national policy have banished for ever. Anderson says, that "the use of Spanish wool was prohibited lest it should have debased the British manufacture." This is a point for the consideration of which the reader is scarcely yet prepared; but at all events, this fact is established, that in the twelfth century, and from the fleece of the British sheep alone, a cloth was made—a broad cloth, of a sufficiently fine quality to give general satisfaction. Thus much, however, may at present be affirmed, that although the British wool, some centuries afterwards, when, amidst the contentions of the rival houses, and the narrow policy of successive monarchs, the true interests of the country were abandoned—sacrificed—was inferior to some of foreign growth, and particularly to the Spanish, and the woollen manufactory was comparatively lost in Britain, yet the weight of evidence is favourable to the conclusion that, in earlier times, it would not yield to any that the continental states could produce. As the history of the woollen manufacture proceeds, there will be additional reason for believing this.

In 1186 the prohibition of Spanish wool was more strictly enforced, and it was ordered, that all cloth of British manufacture that should be found made of Spanish wool, or in which that material should be mixed, should be burned in the presence of the Mayor of London *.

Three years after this, (1189,) Richard Cœur de Lion succeeded to the throne. He embarked in the expedition to Palestine, and was treacherously imprisoned by the Duke of Austria on his return; and he could not obtain his release until he had engaged to pay an exorbitant ransom. As a means of raising the stipulated sum, the plate of all the churches and monasteries was taken, and those orders, who agreeably to their vow of poverty, had no plate, were compelled to contribute one year's wool †. The conclusions to be drawn from this are, that the lands of the religious houses were employed in the growth of wool; that this commodity constituted, next to the plate which was so lavishly displayed around their altars, their principal wealth; and that it was a good merchantable commodity: in fine, that, in easy and immediate application, it stood next to money, and was therefore selected for a purpose like this, which admitted of no delay.

Near the close of this century, another circumstance occurs, which proves the increasing cultivation and value of wool—enough is grown, not only to supply the wants of the native manufacturer, but it begins to find a market abroad. It would seem that its exportation had hitherto not been legalized, or, in fact, had been prohibited; for the History of the Exchequer relates, that in 1128, "the chamberlain of London accounted for 23*l.* 12*s.*, (equivalent to 472*l.* at present,) the fines of merchants for leave to export wool and leather; and 20*l.* (400*l.* present value,) for the sale of wool belonging to William de Boulogne, and which, being attempted to be exported without license, was forfeited ‡. There is no doubt, however, that the occasional exportation of wool had existed almost two centuries.

It also appears, that this contraband exportation was carried to so great an extent, that the government took into consideration the question of legally sanctioning it, and which, on account of the narrow and illiberal notions respecting trade which then prevailed, would not have been for a moment mooted, had not the British market been completely glutted with the commodity. The attempt at illegal exportation, and the amount of the fine for the wool seized, sufficiently prove the overflow at home, and the value of the article abroad. A seizure was made at Hull, in this year, the proceedings on which discover the actual price of wool in the English

* Kennedy's Tenancy of Land, vol. ii. p. 351. † Rapin, p. 254.
‡ Madox's Hist. of the Exchequer, i. 776.

market at that time. The penalty was estimated at 5 marks—3*l.* 6*s.* 8*d.*, the silver mark being 13*s.* 4*d.*—per sack of 26 stone, (or 364 lbs.) which is a little more than 2*s.* 6*d.* (50*s.*) per stone, or almost 3*s.* 6*d.* per pound —an enormous sum, and decisive as to the value of the article at that early period.

In the following year another parcel was seized at the same port. The owner not choosing to pay the estimated value, it was sold by public auction, at 2½*d.* (3*s.* 9*d.* present value) per pound *.

These scattered facts, thus collected together, incontestably prove that at a far earlier period than has been generally imagined, or few of the English historians acknowledge, the cultivation and the manufacture of wool were not only established, but flourished in Great Britain. From the time when the British cloths were accounted unrivalled at the luxurious metropolis of the world, to the period to which the present sketch has reached, the breeding of the sheep, and the manufacture of its fleece constituted the chief employment and wealth of the country.

During the reign of Henry I. several Flemings, driven from their own country by a dreadful inundation, settled in England. They were hospitably received, but it is far from certain that they contributed much to the improvement of British manufacture; for, as will presently be seen, the inhabitants of the Low Countries were never growers of wool to any considerable extent, but their trade was founded on the importation of the material from other parts, which was now only commencing, and the facilities which that importation afforded.

If to the Roman conqueror Britain was indebted for this inexhaustible source of prosperity and wealth, she cherished and perpetuated, and, doubtless, improved it. But a different era now succeeded. To the contentions between John and his Barons followed other disputes and bloody feuds; intermingled with foreign wars when there was a moment's peace at home: and from the frequency of royal exaction, and of brutal outrage, property and every commercial pursuit became so insecure, and almost valueless, that, if the cultivation of the sheep continued, it was not with its former spirit and success, the manufacture of the fleece was comparatively abandoned. Sir Matthew Hale says, that "in the time of Henry II. and Richard, this kingdom greatly flourished in the manufacture of cloth; but by the troublesome wars in the time of King John and Henry III., and also of Edward I. and II., this manufacture was wholly lost, and all our trades ran in wools and woolfells, and leather †."

Our historians, however, have taken this assertion of the learned Chief Justice somewhat too literally. There is no doubt that the English trade materially changed its character; and that the notices of wool, which for more than a century from this time occur, have chief reference to the various artifices by which the royal coffers were filled under the pretext of licence or of fine. It is also probable that the insecurity of property, and the numerous instances of capricious tyranny which disgraced this era of

* In estimating the present value of the different sums of money of which mention has been made, the following calculation has been adopted:—the silver shilling hitherto, and for some centuries after this, weighed three times as much as it now does; and, on account of the scarcity of money, the expense of living varied from one-fifth to one-eighth of what it does at the existing period. The real proportion was continually varying; but in order to avoid exaggeration, and to arrive at an even sum, 6⅔ was assumed as the general average, and this multiplied by three gave twenty; or, in other words, the value of a certain sum then was equal to twenty times as much at the present day. From the increasing quantity of the circulating medium, soon after this period the difference in the expense of living decreased to the average of five; and therefore, and for some centuries to come, the multiplier will be fifteen instead of twenty.

† Primitive Origin of Mankind, p. 162.

the dawn of British liberty, might have driven many of the artisans in wool to other countries. The Low Countries, in particular, might have materially benefited; and it is not improbable that the Netherlands were considerably indebted to Britain for the early establishment of the woollen manufacture among them; although in after years—in the reign of the third Edward—that benefit was returned by the revival of the lost British manufactures through the instrumentality of the Flemings. Many hints, however, of the continuance of the woollen manufacture in England during those troublous times, although in a comparatively depressed state, will occur, as the history of the British sheep is pursued.

In the third year of John, there is a confirmation, in the prosperity of an individual, of an inferior branch of the woollen trade, that its depreciation had only just commenced:—

"An. 1201, David the Dyer pays one mark of gold (2*l.*, equivalent to 30*l.* now) that his manor might be made a burgage *."

As a further proof, if it were wanted, the record of the *custom* or duty paid on the importation of woad—one of the articles used in dyeing—is preserved. It is valuable, not only as showing the almost incredible extent to which the woollen trade has been carried, but the places where the manufactories were principally established. Essex paid, (in 1213.) according to the estimated value at the present time, 12*l.*; London, 540*l.*; Norfolk and Suffolk, 1650*l.*; Southampton, (the port of Winchester,) 2230*l.*; Yorkshire, 3090*l.*; and Kent and Sussex, 3200*l.* † It is pleasing to see the town whence the manufacture derived its birth, still maintaining so high a rank among the rival districts.

In the preceding year, in order for the easier adjustment and collection of the duties on manufactured goods, it was arbitrarily determined that all the better and dyed cloths should be of the same width: i. e. "for dyed cloths, russets, and habergies, 2 yards within the lists ‡."

It incidentally appears, that at this time the woollen manufacture was now established in Ireland, and had made considerable progress there, for Irish cloths were exported to England.

Woollen-drapers or dealers in cloth were also at that time settled in London; for in 1240 a duel was fought between Walter Blowberne and Hamon le Stare, the former having accused the latter of stealing cloths and other goods; among which were one coat of Irish cloth, and a particoloured coat of Abenden and Bunel of London.

At this period the woollen manufacture in other countries had reached a high state of prosperity. Ferdinand II., now recovering Seville from the Moors, found in it sixteen thousand looms for weaving woollen goods §. It appears, however, that in order to make their finest serges, the Spaniards bought wool, the growth of other countries, and chiefly from the Flemish market, to which the greatest part of the wool of England, now allowed to be exported, was carried for sale ||.

The importation of foreign fine cloths was permitted by Henry III. The custom imposed was a source of revenue to him; and he did not consider, or care about the influence it might have on the manufactures and prosperity of the country over which he reigned. The immediate consequence was highly injurious to the wool-grower, whose fleeces, less used at home, and rapidly accumulating from the general goodness and cheapness of the imported fabrics, were hurried away to the Flanders market. This was another source of revenue to the monarch, and at which he had

* Madox's History of the Exchequer, p. 278. † Ibid.
‡ Anderson on Commerce. This was confirmed in 1224. 9 Hen. III. cap. 25.
§ Wansey on Wool, p. 38. || Ibid, p. 29.

probably aimed. In process of time, however, that which was at first the result of distress, became the source of wealth, and the export trade in wool was, for several centuries, the most lucrative that the country possessed.

There has been much dispute, and it is a question difficult to be settled, when the exportation of British *cloth* commenced. Anderson, who is high authority, dates it from about this period, and asserts, that "from the time of Edw. I. to Charles I., the woollen manufacture and the exportation of woollen cloth and wool, were the principal objects of legislation; and that British cloth was sought for with avidity by all nations." On the contrary, Wansey, who maintains, as zealously as Anderson, the comparative fineness of the British wool in early times, and the superiority of the British cloths, asserts that it was not exported until a long time after this; and that the earliest mention of the exportation of British manufactures in any considerable quantity occurs in 1452, in the reign of Henry VII., and two hundred years after the period now referred to. He adds, that the export trade, then established, was not of much benefit to England, for it was managed by the merchants of the Steelyard, who were mostly foreigners.

Madox indirectly confirms the opinion of Wansey, for he says, that "Henry III. gave Simon de Campis, merchant of Douay, leave to import and sell his cloth in any part of England." Although the object of the king was the same as that of all the monarchs of those days, to fill his own coffers, it is scarcely probable that he would have given, or been allowed to give, this permission if the English manufacturers could have furnished sufficient cloth for home and foreign consumption*.

Neither of these valuable writers, however, is perfectly correct. British goods were occasionally exported from a very early period, but in small quantities, and bearing little proportion to the export trade in the raw material. A tax on them was collected by royal authority, but without the sanction of the legislature; and it was not until the time of Henry VII. that it was properly legalized, or yielded much to the support of the state.

Proofs of the ruinous effects of domestic strife, and the destructive influence of foreign wars, begin now to appear. The mark of gold annually paid by the weavers of Oxford for the privilege of forming themselves into a guild, was reduced to 42*s.*, (at 48 to the pound, and therefore equivalent to 17*s.* 6*d.*,) and on this ground, that "whereas they were above sixty in number when they undertook to pay the mark of gold, they were now so poor and decayed, that they were scarcely fifteen in number †." The tax on the weavers of Winchester was also reduced to 6*l.*

The woollen trade continuing to decay, and the British wool being returned by the Flemings in a manufactured state, better and cheaper than the impoverished and fallen artificers of England could produce it, the sale of English cloth seems to have rapidly declined, and threatened to go on to utter decay. The monarch listened to the grievances of his subjects, and consented to abandon one of the most profitable sources of his revenue; and the exportation of British wool was forbidden under very severe penalties. This exercise of regal self-denial, however, continued during a very short period. The ports were again thrown open—the wool was exported in any quantity that the adventurer chose, and the custom exacted varied according to the caprice of the monarch.

* For a more detailed account of this matter the reader is referred to a pleasing little book, "Wansey on Wool." The author detects many inaccuracies in the valuable work of Anderson.

† Madox, Hist. of Exchequer.

About this time mention is first made of the woolstaplers. The grower contented himself with the sale of his wool at his own door, or at the nearest town. Thence arose a description of middle-men or merchants, who bought it of him, and arranged it according to its quality, and instituted a kind of traffic between the grower and the home manufacturer or the foreign merchant. This guild was incorporated under the name of "staplers*." The word staple means the natural or usual products of the place †.

A misunderstanding having taken place between England and Flanders in 1275, all commerce between the two countries was prohibited; but Edward I., whose coffers were then exhausted by his Welsh expeditions, permitted certain Florentine merchants to export to Flanders 1068 sacs, or 281,952 lbs. of wool on the payment of 10*s.* (7*l.* 10*s.*) per sack duty—almost 7*d.* in the pound. The exportation of this great quantity, and by one company only of merchant-adventurers, shows the demand for British wool abroad, and the high estimation in which it was held. The kind of wool the historians of the time neither mention, nor perhaps understood; but from several incidental circumstances, it would appear to be the combing-wool, which then, as now, had no rival. The quantity exported in any given year is not to be collected from these imperfect records: but the export trade continued to increase, and that for two very sufficient reasons, viz., the penury of the monarch by whom it was encouraged, and the little and rapidly diminishing use for the wool at home.

From 10*s.* per sack, the custom was speedily raised to 20*s.*, and in the year 1286, Edward, by his sole power and authority, increased it at once to 40*s.* The agriculturists complained—petitioned. "It seemed not to be sufficient," they said, "that the home trade was ruined; but by this new exaction their wool was raised above the price that any manufacturer could afford to give, and was, in fact, driven out of the foreign market." The monarch was at first indisposed to listen to this just remonstrance, for the produce of the tax was too necessary to him; but, the petitioners preparing to assume a firmer attitude, Edward wisely yielded. He reduced the custom to 20*s.* as before, and promised that it should not again exceed that sum except by the consent of his people, expressed in parliament ‡. That promise was kept for a few years, but afterwards forgotten whenever the sinews of war were required.

In those times commerce was loaded with numerous oppressive and absurd restrictions. It was with great difficulty, and often not until after much sacrifice, that foreigners were permitted to settle and trade in other countries. In the year 1286 merchant-strangers first obtained licence to rent houses in England, and buy and sell their own commodities; for before this time they were compelled to hire lodgings, and the landlords were the brokers, through the medium of whom every bargain was transacted §.

* The woolstaplers have now no virtual existence as a chartered company; but the dealers in wool form one of the numerous bodies constituting the livery of London, and have a small sum of money in the funds, the interest of which defrays the expenses of their meetings and elections.—Anderson on Commerce, vol. i. p. 232.

† Lex Mercatoria by Gerard Malines.

‡ Rapin preserves the words in which this renunciation of the regal claim was expressed. They are worthy of record as one of the charters of British liberty. "And for so much as the more part of the commonalty of the realm find themselves sore aggrieved with the Maletent of wools, that is to wit xl shillings for every sack of wool, and have made petition to us to release the same, WE at their request have clearly released it; and have granted for us and our heirs, that we shall not take any such things without their common assent and good-will."—Rapin, p. 378.

§ The first result of this experiment, or rather this act of justice and humanity, is given in the words of Fabian. The persons referred to were wool-merchants. "In this yere also, whereas of olde tyme, longe before this season, the marchauntes straungers

In 1206, the company of merchant-adventurers, afterwards called the Hamburg Company, was established. They consisted of merchants from all the states that then owed allegiance to the king, and more from abroad than from his native kingdom. In process of time they became almost entirely foreigners. They had power to associate themselves into a body politic; to choose their own officers, to make their own laws for the direction of their business, to impose their own duties, and to act as an independent body. They soon monopolized to themselves the principal part of the commerce of the country, and although, to a certain extent, the interest of the public was theirs, it was too often found that the general prosperity and that of their individual corporation were altogether incompatible. Various abuses gradually crept into the management of this company. A spirit of monopoly and tyranny characterized their proceedings; and although they retained the protection of every successive monarch by being able and ready to supply his temporary necessities, they at length, after a continuance of 350 years, gave way to the expression of public feeling, and ceased to exist.

For many years nothing occurred worthy of note. The price of the sheep is incidentally mentioned, and remained nearly the same as many a century before. In 1299, the price of a fat lamb in London, from Christmas to Shrovetide, was 16*d.** ; three years afterwards, the price of a fat wether was 1*s.*, and that of a ewe, 8*d.*†; and in 1309, there is a notice of an extravagant price given on occasion of an installation feast: 200 sheep cost 30*l.*, or 3*s.* per head‡.

The exportation of wool to the Netherlands, both from England and Spain, had now so much increased, that the cities of the Netherlands were in the most flourishing condition. In Louvain there were reckoned more than 4000 master-weavers and woollen-drapers, and above 150,000 mechanics. The city, although a large one, would not at present contain one half of these inhabitants §.

The year 1313 furnishes a very singular account of the different kinds of cloths at that time manufactured in England, and the difference which then existed between the rich and the poor. The expense of the household of Thomas Earl of Leicester is given. Among other things are 159 pieces of cloth for the earl, the bishop, the knights, esquires, clerks, officers, grooms, archers, and minstrels, 460*l.* 15*s.*, or on the average, nearly 3*l.* each—a very considerable sum at that period; 111 pieces for summer cloaks for the same persons, 345*l.* 13*s.* 8*d.*, being more than 3*l.* each; and for the poor men on Maundy Thursday, 168 yards of russet cloth, and 24 coats, and money besides, only 8*l.* 16*s.* 7*d.*‖

comynge with theyr marchaundise were lodged within the cytezins of the cytie of London, and sold all their marchaundizes by the procuring of his hoost, for which his sayd hoost had a certayne of every lib.—it now was brought to passe, that they might hire to them houses for to dwell in, and for the stowage of theyr wares." These foreign merchants then either began to impose upon the native ones by reason of the increased opportunity they had for so doing; or from the jealousy of the natives, who were deprived of the opportunity of living upon the foreigners, accusations of that nature were maliciously brought against them: "Theyr weyghtes were brent and consumed, and fynallie the said marchaunts were delivered by fyne made to the kynge of a thousande poundes, when they had suffered for a season harde and vyle prysonment." Such was the justice of those days.—Fabian's Chronicles.

* Snilingfleet's Chronicon Rusticum, p. 66.

† Dugdale's Hist. of St. Paul.

‡ W. Thorn, inter Decem Scriptores. The reader will not much err if he multiplies these sums by 15, as expressive of their proportionate value at the present day.

§ Anderson on Commerce, i. 273.

‖ Stowe's Survey of London.

In 1315 a dreadful epidemic broke out in Great Britain, and was confined almost entirely to that island. It arose from a long continuance of rain, which inundated the whole country, rotted the grain, and destroyed the fruits and herbage of every kind. It was followed by a violent dysentery equally fatal to the human being and the brute *. The consequence of this was a grievous famine, which lasted three years, and devastated the whole country. Food of every kind became extravagantly dear, and it was deemed advisable to institute some sumptuary laws: no one was permitted to demand more than 20*d.* (25*s.*) for a fat sheep; if it was shorn, the price was to be 14*d.* (17*s.* 6*d.*) This is a somewhat interesting morsel of history, for it gives the average value of the fleece at that time 6*d.*—7*s.* 6*d.* of the present money—being nearly half as much as the value of the carcase. It will be rendered sufficiently evident in the course of this work, that the modern sheep have increased far more in weight of carcase than of fleece, and that there was far less disproportion between the value of these formerly, than now.

The export trade was in 1320 better regulated, at least so far as regarded the collection of the customs. In order to prevent the fraudulent shipping of it, certain ports were named, at which alone it could be embarked, under pain of forfeiture and fine. These were Weymouth, Southampton, Boston, Yarmouth, Hull, Lynn, Ipswich, and Newcastle.

In 1327, Edward III., the reviver of the woollen manufacture in England, or, as some erroneously say, the founder of it, ascended the throne.

The Pensionary De Witt well describes the debased state of the woollen manufacture and the relative situations of England and the Netherlands at that time:—"Before the weaving trade was removed to England, the Netherlands could formerly deal well enough with that kingdom, the English being only shepherds and wool-merchants, and their king received few imposts but from wool exported, depending on the Netherlands, who were almost the only wool-weavers in Europe."

The summary of what Edward effected cannot be better given than in the language of the anonymous author of a book published in 1599, and entitled "The Golden Fleece."

"The wools of England have ever been of great honour and reception abroad, as hath been sufficiently witnessed by the constant amity which, for many hundred years, hath been inviolably kept between the kings of England and the Dukes of Burgundy, onely for the benefit of the wool; whose subjects, receiving the English wool at sixpence a pound, returned it (through the manufacture of those industrious people) in cloath at ten shillings a yard, to the great enriching of that state, both in revenue to their sovereign, and in employment to their subjects, which occasioned the merchants of England to transport their whole families in no small numbers, into Flanders, from whence they had a constant trade to most parts of the world. And this intercourse of trade between England and Burgundy endured till King Edward III. made his mighty conquests over France and Scotland, when, finding fortune more favourable in prospering his achievements then his alledgeate subjects were able to maintain, he at once projected how to enrich his people, and to people his new conquered dominions; and both these he designed to effect by means of his English commodity wooll; all which he accomplished, though not without great difficulties and oppositions, for he was not only to reduce (bring back) his own subjects home, who were, and had long been settled in those parts, with their whole families, many of which had not so certain habitations in England as in Flanders; but he was also to invite clothiers over to convert his

* Paulet, Recherches sur Epizootiques, vol. i. p. 85.

woolls into clothing (and these were the subjects of another prince), or else the stoppage of the stream would choke the mill, and then not onely clothing would every where be lost, but the materials resting upon his English subjects' hands would soon ruine the whole gentry and yeomanry for want of vending their woolls. Now, to show how King Edward smooth'd these rough and uneven passages, were too tedious to this short narrative, though otherwise in their contrivance, they may be found to be ingenious, pleasing, and of great use.

" But this it must be granted, that King Edward was wise as well as victorious, for upon a visitation made by himself to the Duke of Burgundy, during his residence there, he employed such able agents among the Flemish clothiers, as (barely upon his promises) he prevailed with great numbers of them to come into England soon after him, where he most royally performed those promises, in giving not only a free denization to them, but he likewise invested them with privileges and immunities beyond those of his native subjects, which peculiarities their posterities enjoy to this day. But for the more sure establishment, and before these preparations came into effect, King Edward, upon his return, called a parliament, and that in the beginning of his reign, where he so wrought with the Commons-house, (who had not the least knowledge that the king had moulded the design) as after long debate (which all motions in that house ought to undergo) it was presented to the Lords, and so to the King, who, among other *objections*, urged the loss which must necessarily befall his revenue, as well in respect of the outward subsidy of a noble upon each sack of wooll, which was to be transported, as of the inward custome which the cloath paid upon return, according to the rates then established. But these soon met with an expedient, for the cloath in time to come must needs yield a far greater custome upon that which was to pass into all parts of the world from England, than it could do upon that small return which came onely to the service of England, and therefore for the wooll, which from that time forward was to be wrought in England, and of which none in any sort, without the king's especial licence, was to be transported, the parliament gave unto the king a subsidy of a noble upon a sack.

" Seventy families of Walloons were in the first year brought to England by the invitation and promises of Edward. He kept his royal word to all of them. The greater part were at first settled in Kent, but they were by degrees removed to different parts, and scattered over the whole of England. They shifted their residence according to the facility with which they could obtain water or fuel, or the material on which they worked. The greater number finally settled in Yorkshire, Gloucester, and the western counties."

Anderson very properly remarks, p. 23, " that Edward III. was the first of our kings who clearly discovered the vast benefits accruing to a nation by foreign commerce and manufactures; and it may be added that England, much to her honour, was the first great monarchy in Christendom that entered into any considerable foreign trade and home manufacture; while the other great monarchies continued to contemn the pursuit of mercantile advantages, which they left entirely to the petty states and free cities of Italy, and those of the Netherlands and Hans towns *."

A double motive might have operated on the mind of Edward,—a desire to obtain the means of extending his conquests, for they were not then so complete as the author of the " Golden Fleece" describes them to be; and a desire, separate from his own personal interest, to benefit the people whom he governed. He succeeded; and although historians have been

* History of Commerce, Introd., p. 32.

strangely forgetful of this the most glorious achievement of his reign, he recalled, re-established, and would have established for ever, the staple manufactory of his country, and the most effective source of her power. If the wars of the Roses, which succeeded, once more reduced the woollen manufactory to the state in which he found it, the fault was not his. The Parliament which assembled in 1337, when this monarch was but twenty-five years old, enacted, that no wool of English growth should in future be transported beyond sea. This apparently deprived the monarch of a material source of revenue; but he consented, and that consent was politic, as well as patriotic. The Parliament also decreed that no foreign cloth manufactures should be received, from whatever port they came; and that no one should wear any cloth made beyond the sea; and also that a tax should be paid to the king, of 20*s.* on every sack of wool employed in home manufacture on every piece of cloth of British texture. The consequence was, that before the expiration of the first year, he enjoyed a revenue greater than he had before possessed, and built on a surer foundation. The prosperity of the home manufacture had its effect on the grower of the wool. The flocks of sheep rapidly increased, and the supply of wool became greater than the market at home could dispose of: it began to lie on the hands of the grower, and at the entreaty of the grower and the manufacturer, the prohibition against exportation was removed, and from this quarter also, the monarch derived a greater revenue than any of his predecessors had done.

His wars in France continued; but he found in the commerce in wool an inexhaustible resource. When his treasury ran low, he appealed to the patriotism of his people, either to increase for a while the duty on exportation, or to anticipate the payment of their taxes, or to grant him a loan for a certain period. When they had no money to offer, they produced their wool. He had increased the quantity and the value of it. It found a ready market every where,—his immediate wants were without delay supplied, and in due time the debt was discharged. Edward, young in years, but old in policy and wisdom, foresaw all this. Why have so few historians done even cold justice to him, or why should a strange and almost universal silence prevail with regard to another principle, to which the youthful monarch could not be quite insensible, that of patriotism?

The impulse to a reviving trade having been given, some of the old arbitrary restrictions were removed. The English monarch soon observed that the woollen trade assumed a buoyancy and vigour, which it would be impolitic to confine within the narrow bounds of his dominions; he saw that he had no cause to fear from the competition of others; and he reasoned that he could not expect from others facilities which he did not grant to them; and therefore he threw open the British trade to all countries, both the exportation of British wool, and the importation of foreign cloth, on the payment of a certain tax. When the English wool again began to find its way to Flanders, it readily sold for almost any price that the merchants chose to ask. Smith * says that it was worth 18*l.* or 20*l.* a sack; and Rapin adds †, that, in this very year, 1337, English wool sold in Flanders at the exorbitant rate of 40*l.* per sack. Ten thousand sacks (2,640,000 lbs.) were said to be bought in Brabant at that price, which is rather more than 3*s.* a pound, the difference in the value of money not being reckoned.

There must be some error in this, or there were circumstances with regard to which the historian is silent, that had an extraordinary influence

* Chron. Rusticum. † Acta Regia, p. 151.

on the price of wool at this particular period:—20*l.* per sack, or 1*s.* 6*d.* per lb., the value of money (although then beginning to decline) being taken into consideration, would constitute a price scarcely credible.

There is a document quoted by Smith, which records the prices of English wools in 1341, for home use and for exportation, and which is far more likely to be correct. It is a highly valuable one, not only as giving the price of wool, but the relative value of the wools grown in different districts at that period.

	To the staple for home use						For exportation			
	per sack.			per stone.			per sack.			per stone.
	£	*s.*	*d.*	*s.*	*d.*	£ *s.* *d.*	*s.*	*d.*	£ *s.* *d.*	*s.* *d.*
Salop . .	6	6	4	5	0	7 6 4	5	9	9 6 4	7 3½
Do. stuffs, including Leicester . .	5	6	8	4	2	6 6 8	4	11	8 6 0	6 5½
Nottingham . .	4	13	4	3	7	5 13 4	4	4	7 13 4	5 10½
York and Rutland	4	10	0	3	5½	5 10 0	4	2½	7 10 0	5 9
Derby . . .	3	3	4	2	5	4 3 3	3	2	6 3 4	4 8½
Cumberland and Westmoreland .	2	13	4	2	1	3 14 4	2	10	5 13 4	2 4½*

These were principally or entirely long wools, such as were required for the manufactures of Belgium, and also for the serge manufactories of Spain. On this account the Ryeland wools and the wools of the south-eastern districts are omitted. The Cotswold is probably included in the Salop.

If the best wool usually cost the merchant 9*l.* 6*s.* 4*d.* per sack before it was shipped, it may be imagined that, under some extraordinary circumstances, the price in Belgium might be 18*l.* or 20*l.*, but the tables of Smith and Anderson give a more correct statement of the average price at that period, and a high remunerating price it is. Considering the value of money to be now materially changed, and that the multiplier should be 12 only instead of 20, the price of the best wool at the first-hand would be more than 4*s.* per lb., and it is no longer surprising that the wool-grower was able to submit to impositions in the name of taxes, benevolences, and tolls, which would have absolutely ruined the farmer of the present day. If the account given by Rapin of the quantity of wool exported to Belgium at this period can be relied on—2,640,000lbs.—and that of fine wool which sold at a most extraordinary price, it is ne...ly three-fourths of the weight of wool of every kind which is exported at the present moment; and if to this is added much coarser wool, likewise sent thither, and the immense quantity used in the home-manufacture, it will be sufficiently evident, that the aggregate growth of wool could be scarcely inferior to that of later times.

In 1342, the king sent a great number of sacks of wool to Cologne, in order to redeem Queen Philippa's crown, which was pawned there for 2500*l.* The average price of that wool was 1*s.* 3½*d.* per lb.†

* Anderson, in his Origin of Commerce, gives a nearly similar account of the prices of some of the wools in 1343, when exported—Shropshire, 9*l.* 6*s.* 8*d.* per sack; Oxford and Staffordshire, 8*l.* 13*s.* 4*d.*, and Leicester, Hereford, and Gloucester, 8*l.* The lowest wool is that of Cornwall, which is valued at no more than 4*l.*

† The wool had hitherto been weighed by means of steelyards of nearly the same construction with those in country places at the present day; and hence the yard in which the merchants usually meet was called the Steelyard. A great deal of deception might be practised by varying the weight which was appended to the beam, and also by falsely graduating the beam; and it would seem that this was carried to so great an extent, that in 1352, the weighing by means of the steelyard was prohibited, and an equal balance introduced.—Chron. Rust. i. p. 38.

In 1354 the exports had risen to 31,651 sacks of wool, or to the almost incredible quantity of 8,356,864 lbs., the duty on which the wary Edward, taking advantage of the turn of the times, added to his treasury, amounting to 277,606*l.* 2*s.* 9*d.* of money, or three and a half millions of pounds, according to present computation *.

Now likewise occurs the mention of the first exported manufactured goods, 4774½ cloths (probably broad cloths), of the value of 40*s.* each, and amounting to 9549*l.*; and also 8061 pieces of worsted (worsted goods of various kinds), and valued at 16*s.* 8*d.* the piece, and amounting to 6717*l.* 18*s.* 4*d.* The duty on these was 215*l.* 13*s.* 7*d.*, and the whole amount of the value of the goods and the duty was 16,481*l.* 11*s.* 11*d.*

On the other hand, there were imported 1832 cloths (broad cloths) of the value of 6*l.* each, and, with the duty, amounting to 11,083*l.* 12*s.*; and leaving a balance in favour of the imports of 5397*l.* 19*s.* 11*d.* But the whole commerce of the year left a balance in favour of the exports of 255,214*l.* 13*s.* 8*d.*, or, computing the difference in the value of money and expense of living, 3,825,220*l.* 5*s.*; a most extraordinary balance, and showing the frugality of the times and the resources of the country †.

The art of spinning worsted yarn had now made much progress in England. This peculiar species of manufacture seems to have been first established in Norwich, which was at this period become a large and populous town. The quantity spun there does not appear, for some time, to have been sufficient for the home supply, and therefore, in the year 1348, the exportation of these yarns was prohibited. In a few years afterwards, however, the worsted yarn was exported in considerable quantities, and then the manufacture of it rapidly extended through the whole of the county, and through Suffolk and Cambridgeshire southward, to the midland counties westward, and to Yorkshire towards the north.

As the woollen trade increased, various impositions began to be practised. The reader may see a long and somewhat humorous, yet disgusting list of them in "The Golden Fleece," already referred to. In order to prevent these frauds, an *alnager*, or sworn officer for the inspection of woollens was appointed. Mention is first made of him in the year 1352. It was his duty to measure the pieces of cloth exposed to sale, and inspect their quality; but, if the author of "The Golden Fleece" is to be believed, he too frequently paid more regard to the accumulation of his own fees than to the collection of the duties of the crown, or the preservation of the subject from imposition. Regulations were also this year enforced with regard to the sorting of wool, an operation which left too much room for fraud.

In this year also Edward made another successful experiment on the benevolence of his people. Berwick was sacked by the Scots. In order to enable him to recover it, an impost of 50*s.* per sack was levied on all the wool exported for six years, "so that," says Wheeler, "the said king might dispend everie day 100 markes, which in sixe yeares time amounted to 1,500,000 pounds, reckoning 100,000 sacks of wooll a yere transported ‡."

This author, being secretary to the company of Merchant-Adventurers, had access to every source of correct intelligence, and would scarcely dare to deceive; yet this seems an almost incredible quantity of wool exported. 100,000 sacks are equivalent to 36,400,000 lbs. Although the British commerce at the present time extends to every quarter of the world, and German wools either constitute the sole material, or form the greatest proportion in almost every fine cloth, the whole importation does not amount

* Anderson on Commerce, i. 335. † Misselden's Circle of Commerce, p. 119.
‡ Wheeler's Treatise on Commerce, 1601, p. 64.

to 40 millions of pounds, and the exportation is not quite one-eighth of that quantity *.

In 1386 Richard established a company, or guild, of linen-weavers in London. They had emigrated from the Netherlands, where the linen-manufacture was in a flourishing state. These men were much annoyed by the woollen weavers' company. It was difficult to wean a nation of shepherds from their attachment to wool, and the project failed.†

In 1388, by Act of Parliament, the wages of the bailiff of a farm, exclusive of his board and lodging, and clothing, once a year, was 1*l.* 13*s.* 4*d.* per annum. The wages of a carter, or shepherd, 10*s.*, and that of the cow-herd, and ox-herd, 6*s.* 8*d.*

In 1382, the 5th of Richard II., a circumstance occurred, so connected with the liberties of England, and doing so much honour to the Parliament then sitting, that it must not be passed over in silence. "The Lords and Commons fearing lest, by the continual grants of the subsidies of wool, the same would grow into custom, and so be challenged by the king as of right; for avoiding this, granted to the king the like subsidy of wools as was last granted, from the feast of the Circumcision until Candlemas-then following, so as the space between Christmas and the Circumcision should be an interruption to the king's claim if it were attempted ‡."

In 1390, the 13th of the imbecile Richard II., the exportation of wool was prohibited to the natural subjects of the kingdom, and the privilege granted only to certain favourites and foreigners. Wool then became so cheap, that the best of it was sold at 3*s.* per stone, and the grower could obtain no more than 20*d.* or 2*s.* per stone. This gave rise to great murmurings and threatenings of insurrection, and the king was compelled to throw the exportation trade open as before. The consequence was, that no fewer than 130,000 sacks were exported in the following year, and each charged with a duty of 40*s.* § 130,000 sacks contain 47,320,000 lbs. of wool.

* In 1382 leave was given to export to Rome, as a present to the Pope, six pieces of green tapestry, powdered with roses; two great pieces of red serge, for adorning a hall, worked with the arms of the Pope, the King and the Church; various mantles of cloth; various beds with testers; lined garments; hoods, common, and for days of ceremony, &c. &c., showing that the woollen manufacture had now made considerable progress in England.—Rymer's Fœdera, vol. vii. p. 356.

† Anderson on Commerce, i. 379.

‡ Chronic. Rust. i. 52.

§ In the seventeenth year of this monarch, an act was annulled, which should never have had existence. The regulations determining the length and breadth of every description of cloth, and which was not to be deviated from under very severe penalties, was repealed, and every person was permitted to make his cloth of what length and breadth he chose.—Chron. Pret. i. 55.

Under Henry VII. these absurd restrictions were again enforced.—Idem. 62.

In Rymer's Fœdera, there is a curious record of the whole of the revenue of Henry V. in the last year of his reign, and showing how great a portion of it was derived from the sheep:—

	£	s.	d.
Duty on wool exported .	3976	1	2
,, on 80 manufactories at home	26,035	18	3½
Small customs, miscellaneous .	2438	9	1¼
12*d.* per pound on all goods, probably both exported and imported .	8237	10	9½
Quit-rents, fines, &c. . .	15,754	11	1¼
	55,754	10	10¼ or about 836,320*l.*

of the present money.

More than 30,000*l.* of this is derived from wool exported and manufactured, and probably a considerable proportion of the 8237*l.* was derived from woollen goods imported or exported.

From this period the price of British wools appears to have progressively declined; and it may not be difficult to assign a cause for it. The Spanish wools were becoming more in repute, they were employed extensively in the manufacture of broad cloths; and from the altered condition of the inhabitants of the Low Countries, the fashion of the times changed too, and the nature of the fabrics was changed, and worsted goods, and not of the same good quality, were more in request. This would speedily influence the character of the fleece. The intelligent agriculturist knows well how to grow the wool which the fashion of the day requires; and now, probably, began a change in the character of the sheep in France, in the Netherlands, and in England. The Romney Marsh, and the Lincoln, and the Leicester, if they did not then spring as it were into being, were at least more diligently cultivated, and the older fine-woolled sheep were to a lamentable degree abandoned *.

Notwithstanding this, however, the long wools continued to be decidedly superior to those of foreign growth, and accordingly attempts were made to export not only the British fleece, but the sheep too. The practice was rapidly increasing, and was fraught with mischief to the British sheep-owner. A law of Henry VI., in 1425, forbids it. The preamble states, that "whereas divers persons have from time to time carried out of the realm great numbers of sheep with fleeces into Flanders, and other countries beyond the sea, and there shorn them, and sold both the sheep and the wools, and thus the number of such sheep in the said country of Flanders is likely to be much increased, and the custom of wool lessened, and the price of wool abated;" therefore, under forfeiture of the sheep, the exportation of them was thenceforward prohibited, unless special licence was obtained for the same †.

This confiscation was afterwards considered an insufficient punishment of such a crime, and in the eighth of Queen Elizabeth it was enacted, that the first offence should be followed by forfeiture of all the goods, and imprisonment for a year, and the loss of the left hand. The second offence was made felony, without benefit of clergy. This law is, to the disgrace of the statute-book, still unrepealed. The secure foundation of the staple commerce of our country and the true principles of trade are now, however, better understood, and the enactment remains as a dead letter, yet a blot on our legislature ‡.

The Scots now carried on considerable traffic with the Flemings; and very great quantities of the northern wools were exported, which, although not so fine as those of England, served for various manufactures. Their own manufactured coarse woollen goods were also sent, and found a ready sale; and the Scots being even a more frugal people than the English then were, the balance of trade was very much in favour of their country §.

In 1437, Don Duarté, king of Portugal, and brother-in-law to the king of Castile, from whom he might have easily obtained the choicest of the Spanish wool, made application to Henry VI. for liberty to export 60 sacks of Cotswold wool, in order that he might manufacture certain cloths of gold at Florence for his own use ‖. Anderson very wrongly remarks, that "the superiority of the English wool above the Spanish of that day is here clearly ascertained." He forgets that, whatever might have been said of the English short wools in earlier times, there could be no competition between the long Cotswold wool and the Spanish wool. They

* Luccock on Wool, p. 56. Chron. Pret. An. 1425. Anderson on Commerce.
† Anderson on Commerce, vol. i. p. 441. ‡ Idem, p. 442. § Idem.
‖ Chronic. Pret. p. 86.

were essentially different; the first was a combing, the other a carding wool, and they were employed in the manufacture of fabrics altogether unlike. Don Duarté wanted one of those light and beautiful fabrics which used to be prepared with the long wool, and which that alone could yield; and with no disparagement of the Merino wool, which was suited to fabrics of a closer nature, he had recourse to the Cotswold fleece.

The government of the Low Countries began now to be jealous of the rapid increase of the British woollen manufactures, which necessarily caused a corresponding diminution of theirs, and they prohibited the exposure and sale of the British fabrics in any of their markets. This was a most injudicious act, for they were dependent on the supply of British wool for the existence of their remaining manufactories, and which were numerous and valuable. An order of Henry's Privy Council, forbidding the reception of the Flemish cloths, and the exportation of British wool, soon brought the Netherlands to their senses: their prohibition was repealed, and all things went on as before *.

A paragraph in Stillingfleet gives the price of sheep about the middle of the reign of Henry VII. In 1449, 15 sheep were sold for 36*s.* 10*d.*, or at the rate of 2*s.* 5½*d.* each, or, according to the value of money at that time, 29*s.* 6*d.* †

In 1453 a new era in the British manufacture may be said to have commenced. The Chinese appear to have been first acquainted with the manufactory of silk. In the time of the Romans it had found its way to the islands of Greece, but was long confined to the Greek empire; thence it diffused itself to Sicily; by degrees it established itself in Italy, and was carried into Spain; at a still later period it was adopted by the French. Fabrics of silk had been occasionally used in England for more than 200 years prior to the time now under consideration. In 1251, at the marriage of Margaret, the daughter of Henry III., a thousand English knights appeared in clothes of silk. When, in 1415, Henry V. embarked on his expedition to France, one of his ships carried a sail of purple silk, on which were emblazoned the arms of England and France; but it was now for the first time that it could be concluded that the manufacture of silk was known in England, and certainly never until now had it been placed under the protection of the law. By an express enactment, the importation of wrought silk was forbidden in England.

In 1641 the commerce in wool had again begun to experience the paralysing influence of civil war. The manufactories of it were almost closed, and the price of wool, not perhaps of the best quality, had fallen to 18*d.* the stone, or somewhat less than 16*d.* per lb., according to the present value of money. The sheep-growers began with much reason to complain; the people of Bristol and of Norfolk were foremost; and Edward IV., who had just fought his way to the throne, prohibited the exportation of wool except to the town of Calais.

In 1464 the celebrated present of Cotswold rams was sent by Edward IV. to Henry of Castile; and in 1468 another flock was shipped for John of Aragon ‡. It has already been stated that they were designed to improve the long-woolled breed of Spain. They never mingled with the migratory flock, from which the modern Merinos have descended.

It appears from the records of the same year, that the master clothiers had discovered and adopted the unfair practice of paying a part, if not the whole, of their workmen's wages in goods of various kinds. They now compelled their people to take pins and girdles, and various unprofitable wares,

* Anderson on Commerce, vol. i. p. 469. † Chronic. Pret. p. 66.
‡ Anderson on Commerce, vol. i. p. 493.

instead of money, and at such rates as they chose to impose. Great discontent arose among the mechanics; complaints were made to the government, and it was enacted, that "the clothiers shall pay ready money to their work-people, and shall deliver wools at the due weight thereof, under forfeiture," &c. *

Edward, in his zeal to restore the trade in wool to its former prosperity, had meddled somewhat incautiously and arbitrarily with some of the manipulations in the manufacture of certain cloths. The Devonshire weavers, who it seems were at this time engaged in the fabrication of serges and goods of that description, had thought it advantageous to mix with the coarser wool used in their cloths some of "the flocks,"—the small portions of wool which were torn off the cloth as it passed over the cylinder in the act of dressing, and which then, probably, as now, were thought by some to be of little more worth than to be used in the filling of mattresses. This had been represented to the government as an act of imposition by some busybody who knew nothing about the matter, nor to what a degree the coarse and unyielding fibre of the Devon wool might be softened by admixture with these flocks, bruised and broken down by the action of the cylinder; and Edward had condescended to legislate about an affair like this, and had strictly forbidden it. Anderson says, "that the hundreds of Liston, Tavistock, and Roxburgh, in the county of Devon, stated they had been accustomed from time immemorial to use flocks, and that without this indulgence they must be undone, because their wool is so gross and stubborn, that cloth cannot be made thereof without mixing with flocks." In consequence of this memorial, the act was, of course, immediately repealed; but how degraded must the government have appeared that could ignorantly concern itself with trifles like these †!

In the next year but one, 1470, there is an opportunity of comparing the price of Spanish wool at that time with the depreciated value of the English. A Spanish vessel, bound for the Netherlands, was taken by an English privateer. The owners laying a claim for damages, the wool was stated as being worth 9*l.* 12*s.* per sack, or 6*d.* (6*s.*) per lb. But now English wool of the first quality would scarcely yield 2*d.* (2*s.*) per lb. at home; Sir John Paxton's was "right well sold" at 1½*d.* (1*s.* 6*d.*) and in the foreign market it was unsaleable or almost unknown. England had since been devastated from shore to shore by civil contentions. Needs there any other illustration of the duty of the government, and the true interests of the state?

Towards the close of the reign of Edward IV., a most shameful instance of favouritism occurs. He granted leave for his sister Margaret, Duchess dowager of Burgundy, yearly, during her life, to export from England, without paying custom, toll or duty, one thousand oxen and two thousand rams to Flanders, Holland, and Zealand. Her object doubtless was to improve the breeds of cattle and sheep; and the monarch forgot, or cared not, how deeply he wounded the commercial interests of his kingdom, dependent on the demand for British wool in the Flemish marts. The resemblance between the cattle on the two shores is thus well explained; and the traveller will cease to wonder that on the northern coast of France, and through nearly the whole of Flanders, he thinks that he finds again the identical sheep of the Kentish pastures ‡.

* Anderson on Commerce, vol. i. p. 484.

† Ib. vol. i. p. 490.

‡ A very interesting letter from Margery Paston, wife of Sir John Paston, one of the members of the first Parliament of Edward, is preserved. She is staying at the manor-house, while the husband is attending to his duty in London. She thus writes:—"The people of this country live in hopes he shall help to set a war, that they may live in better

In 1489 King Henry VII., all whose acts were characterized by a narrow policy, in order to obtain a market for the inferior kinds of British wool that were accumulating on the hands of the farmers, enacted certain sumptuary laws. He imposed a penalty of 40*s.* for every yard of fine scarlet or other grained cloth that was sold at above 16*s.* per yard; and of any other coloured cloth above 11*s.* He even condescended to legislate respecting hats and caps: no hat was to be manufactured, the price of which exceeded 20*d.*, nor any cap—such as are seen on the heads of persons of rank in the old pictures of these and somewhat later times—above the price of 32*d.* This shared the fate of all absurd enactments of the kind: it was evaded in every possible way, and at no great distance of time annulled.

The interests of England and Flanders were most intimately connected, and it had been so contrived by the tacit consent of both parties, that whatever might be the quarrels between Britain and the continental states, the Low Countries should rarely be directly involved; but in 1793 a rupture took place between them, and all commercial intercourse ceased. This was severely felt by both countries: England could find no mart for her surplus wool, and the Flemings could not procure the material to feed their manufactures; and such an unnatural state of things continued during three years. The Lord Chancellor Bacon describes this with his usual quaint humour: "By this time the interruption of trade between the English and Flemish began to pinch the merchants of both nations very sore. The king, who loved wealth, though very sensible of this, held out so far as first to be sought unto;" and the Flemings, with most good sense, "speaking first," the quarrel ceased *.

The long reign of Henry VIII. succeeded, when the degradation of the British fleece was carried to a greater extent. It is true that no civil wars then raged, but the attention of the people began to be distracted by religious dissensions. The ultimate effect of these scenes was glorious to the cause of true religion and rational liberty; but during the process, the commercial interests of the kingdom were either abandoned, or sacrificed by a succession of crude, impolitic, and destructive enactments. The price of wool fell still lower than in the time of the seventh Henry, and attendant on that was the loss of motive to induce the farmer to take care of it; and, with that, the palpable deterioration of its quality—a deterioration from which perhaps it has never perfectly recovered. From the reign of this monarch the British short wool has not always headed the market at home, and abroad many a rival has sprung up successfully to combat with it; while

peace in this country, and that wools" (still even in their depressed state the staple produce of the agriculturist, and that which was first in his thoughts) "shall be purveyed for, that they should not go out of this land as they have been suffered to do. Then shall the poor people live better than they have done by their occupation therein. Thomas Crome has sold all your wool here for 20*d.* per stone, to be paid at Michaelmas, and it is sold right well, because the wool was for the most part right feeble."—Fenn's Original Letters, vol. iv. lett. 12.

* The natural connexion between England and Flanders is thus pleasantly described by an old writer. It is to be remembered, however, that it is an Englishman who is telling his story:—

They (the Flemings) may not liven to maintain their degrees
Without our English commodities,
Wolle and tinne: for the wolle of England
Sustaineth the commons Flemings I understand.
Then if England would her wolle restraine
From Flanders, this followethe in certaine,
Flanders of nede must with us have peace,
Or els she is destroyed without lees [release].

Hakluyt's *Navigations*, vol. i. p. 188.

it would seem as if some of the old breeds of fine-woolled sheep had vanished altogether.

During the reign of this monarch, there occurred a few instances of the accumulation of wealth by certain manufacturers, which reminded the observer of the times when the woollen manufactory had not been ignorantly or systematically sacrificed. Foremost among them was John Winchcombe, better known by the cognomen of Jack of Newbury: he kept 100 looms at constant work, and had sent to Flodden Field 60 soldiers, fully equipped at his own expense.

In 1530, the twenty-fifth year of this reign, the spinning-wheel was invented by Jurgen of Brunswick. It is a simple machine, and is most intimately connected with the rapid progress of this branch of the woollen manufactory. The previous substitutes for it were complicated and ineffectual.

In 1531 the price of an ox was 1*l.* 6*s.* 8*d.*, a sheep 2*s.* 10*d.*, a hog 3*s.* 8*d.*, and a capon 6*d.* In 1533 a new regulation was enforced with regard to the sale of butcher's meat. It had been usual for the butchers to divide the carcase as they pleased, and to demand a certain sum for a certain piece or joint. This was supposed to afford room for much imposition; and it was enacted—(when the spirit of legislative interference is once excited, to what will it not extend?)—that the meat should be all sold by the pound: beef at 1½*d.* and mutton at three farthings the pound; the average price of a fat ox being then 26*s.* 8*d.*, and of a fat wether 3*s.* 4*d.* The folly of this was soon evident; and the absurd regulation was speedily repealed.

This account of the price of oxen and sheep throws some light on the comparative size and weight of these animals at the period referred to. It is well known that the black cattle—and there were few others at that time—were considerably smaller than they are now usually found to be; but the carcase of the fat wether, if it did not weigh more than one-eighth as much as that of the ox, must have been strangely diminutive. The truth is, that the sheep at that time was not bred for the carcase as well as the fleece, but almost or quite exclusively for the latter.

The same year was disgraced by the establishment of a monopoly of the manufacture of certain articles in certain towns, to the exclusion of the whole country besides. The city of York led the way. Its memorial stated, that "the city of York afore this time had been upholden principally by the making and weaving of coverlets, and the poor thereof were daily set on work in spinning, carding, dyeing, and weaving, and that the manufacture having spread into other parts, was thereby disgraced and discredited!!" The monarch listened to this worthy plea, and in accordance with the spirit of the times, and his own spirit too, he decreed that none should make coverlets in Yorkshire but inhabitants of the city of York. Worcester preferred the same complaint, and it was enacted that its peculiar manufacture should be restricted to that city and four other towns, Evesham, Droitwich, Kidderminster, and Droitwich. Worsted was declared to be the private commodity of the city of Norwich. Is it surprising that under Henry VIII. the woollen trade, thus "cabined, cribbed, confined," should languish, and go into comparative decay[*]?

In the next year there was a still more ridiculous interference with the sheep-breeder. The number of sheep that, with few exceptions, agriculturists were permitted to keep was not to exceed two thousand. The question of large or small farms comes not here under consideration, but the pretext was, the great rise in the price of various commodities; and the

[*] M'Culloch, art. Wool.

power which the large sheep-owner had to influence, and by a combination with others, determine the price of wool, and push it beyond all reasonable bounds. It was alleged that by means of a species of monopoly the price of sheep had risen to 5*s.* or 6*s.* each, and clothing wool from 3*s.* 4*d.* to 4*s.* per stone. If it were so, it was the best thing that could happen to a nation of shepherds and sheep-owners, and it was a state of affairs which the enlightened legislator would endeavour to perpetuate rather than change;—it was a state of affairs that should have been hailed with delight, as promising a return of the olden time, when the growth and exportation of wool was the foundation of England's glory. Whether such prohibition still continues to disgrace the Statute-Book the writer of this is ignorant: but on comparing the facilities which large farmers possess over small ones, with respect to the fattening of the sheep and the growth of wool, such restrictions must be highly injurious and absurd. This regulation was seldom enforced at the time when it was enacted, and it is now, and most advantageously for the general interest, universally neglected *.

The short reign of Edward VI. was distinguished by an attempt at that which at a more recent period formed so beneficial a revolution in sheep-husbandry,—the inclosure of the waste ground. The woollen manufacture only wanted to be let alone in order to flourish. The last ten or twelve years of Henry VIII. had been exclusively devoted to the accomplishment of his favourite scheme of separation from the church, and also to the exercise of much domestic tyranny, and the experience of much domestic suffering, and the woollen manufacture had been let alone. The consequence was, that the home trade was beginning once more to flourish, and the peace lately concluded with France opened a foreign market. The price of wool increased, and the farmer again took to the breeding of sheep. Unwilling to bring back to sheep-pasture the land which in the depressed state of the trade they had submitted to the plough, they wanted more ground than they possessed. They began to inclose the waste spots that were their own immediate property, and they were aiming at something like a general inclosure. This produced great discontent among the cottagers. While there were no overt acts of violence, the landed proprietors heeded not the complaints of the peasants, and a bill was introduced authorizing these inclosures to a very considerable extent; it passed the Lords, but was thrown out by the Commons. The Lords, however, and the generality of the landed proprietors, asserted their right to do as they would with their own, and the work of inclosure progressed. This gave universal discontent; and the Romish priests, anxious to avenge their own supposed wrongs, —anxious to recover their own supposed rights—exerted themselves to foment these complaints, and there were numerous risings of the people.

* In 1527 there was a repetition of the quarrel, and childish sulkiness between the English and the Flemings; Henry had imprudently leagued himself with the French against Charles V. of Spain, and that monarch forbade his Flemish subjects to deal with the British. The manufacturers and their workmen again suffered severely, and at length became tumultuous and violent. They were for a while appeased, and an interview took place between the merchants and Wolsey. "Why will you not buy these goods?" said he, forgetting that there were none to purchase them again, and showing, with all his other policy, his utter ignorance of trade; "if you continue thus to distress the manufacturer, the king himself will open a new cloth market at Whitehall, and buy up all these things and sell them again." "His Majesty," replied one of the merchants, "had better buy them at the old market at Blackwall, it will be more convenient for the foreigners." The Cardinal had nothing to reply to this, but dismissed the merchants with raising expectations that could not be realized, and which he never meant to attempt to realize—"that some way should be found to get rid of all the cloth and wool." The people were pacified for a while, but the evil remaining unredressed, they were again becoming discontented, when an unexpected truce restored everything to its proper channel.—Anderson on Commerce, ii. 50.

Norfolk led the way, and a general insurrection was threatened. The landed proprietors gave way: they restored not the enclosures which they had made, for they were wise enough to see the benefit they must ultimately derive from them; but they lowered their rents, and the peasantry were satisfied.

The short reign of Mary might likewise be passed over in silence, but for an incidental proof of the now rapid improvement of the woollen trade, and which will be found briefly stated in a note *.

In 1558 Elizabeth ascended the throne, and the religious disputes which had so long agitated and impoverished the country having been finally settled, the attention both of the government and the people was directed to the revival of commerce; and among the other branches of it, and the most important of the whole, the woollen manufacture. The times were propitious. The wise and firm administration of Elizabeth, and the quiet establishment of a religion embraced by the majority of the people, were pledges of lasting tranquillity; they were assurances that both the agriculturist and the manufacturer might once more securely embark their capital in the pursuit of England's staple trade. The situation of foreign countries was propitious. In the Netherlands and in France, religious dissensions had commenced; they distracted the attention of the people from the affairs of commerce; and in the minds of many they betokened the approach of a period when neither the property nor the lives of the disputants might be safe, and these persons cautiously retired from the evil to come. They found a refuge and a welcome in England. They brought with them their improvements in different manufactures, and began to employ them for their own emolument, while the native artisans were instructed and benefited. In the 6th and 7th years of Elizabeth, and before the storm had burst abroad, the woollen manufacture had so much increased, that the export of goods to Antwerp alone amounted to 750,000*l.*, and the whole value of the exports in 1561 was 1,200,000*l.*, or 1,300,000*l.*, and all fabricated of English wool †. This is a great sum for that period; but so decided a diminution of the trade of the Low Countries may be accounted for by the circumstances of the times. There were distant but evident threatenings of a religious civil war—an anomaly always most disgraceful and fatal. Venice was impoverished, and its trade destroyed by a nine years' war; South America was just discovered, and the consequence of this was, that gold and silver had become more plentiful in Europe, and trade had in every way increased. A commercial treaty had been concluded with Sweden, and the Russian Company had been instituted. All these things must have tended to give a new vigour to the woollen trade, and may be readily believed to increase it even to this extent ‡.

* On a creation of Serjeants at Law in 1555, Mr. Allen, a draper of Watling-street, was appointed to furnish the robes of ceremony. The following is a copy of his bill to each:—

		£.	s.	d.
A robe of scarlet cloth, 5¼ yards, at 33s. 4d.	. .	9	3	4
Ditto violet ingrain, ditto at 18s.	. . .	4	8	0
Ditto brown blue, ditto at 14s.	. . .	3	17	0
Do. mustard & murrey, do. at 10s.	. . .	2	15	0
		£20	3	4

Reckoning the different value of money, this is a very great sum, and furnishes another proof of the buoyancy of this manufacture, and the degree to which it seems to be naturalized to the British soil.—Dugdale, Origines Juridicales.

† Vide Camden.

‡ Guicciardini, speaking of the flourishing state of the Flemish cities, and particularly of Antwerp at this time, says, that "500 ships were often seen collected in her

Elizabeth continued to pursue that cautious and wise policy to which she was indebted for the success that attended all the proceedings of her government. The trade in goods of home manufacture so rapidly extending, she was urged to prohibit the exportation of British wool, and thus make the whole secure; but she at once refused. She knew that there could be no better means of diminishing the export of wool, if that were an evil, than the profitable employment of it at home. She gave every encouragement to the manufacturer; she permitted the grower to dispose of his produce as he pleased; and thus established the commerce of her kingdom on its only just and permanent basis.

The storm at length burst over the devoted countries on the other side of the Channel. The ferocious Alva overran the Netherlands, and his course was marked by the desert which he left behind him. In six years 18,000 men perished by the hands of the hangman alone; in France, nearly 100,000 persons were massacred in the course of a few days, and the destructive war of the Huguenots succeeded.

The number of the refugees now increased in a tenfold degree; the city of London contained no less than 5000 of them. The decayed towns of Canterbury, Norwich*, Sandwich, Colchester, Maidstone, and Southampton, were filled with manufacturers of woollen and silk†. Although there were some fanatics among them, the great majority were peaceful and grateful; and by the superior machinery and more skilful manipulations which they introduced, and the cheaper and better fabric which England was afterwards enabled to send into the market, they more than repaid the debt, and essentially contributed to the lasting prosperity of the country in which they found refuge.

"Thus," says the Pensionary De Witt, "when the compulsive laws of the Netherland Halls had first driven the cloth-weaving from the cities into our villages, and thence into England, and that by the cruelty of the Duke D'Alva, the say-weaving went also after it, the English by degrees began to vend their manufactures throughout Europe, and then they became potent at sea; and *he who is powerful at sea is a lord at land, and more especially a king of England*, seeing that by reason of the westerly winds, which blow for most part of the year on this side of the tropic, he is able, both whole fleets and private ships of war, to sail out of his numerous bays and harbours at pleasure, and destroy the navigation of his foes." '*Cui adhæreo præest*,' was the motto of Henry VIII.—"He whom I assist shall be master.' This immutable lesson, as it regards the prosperity of England, is not foreign to the present work. The prosperity and glory of England were first based, and they must ever rest, on her pre-eminence at sea, and that arose from her commerce; and for many a century the staple, almost the only articles of British commerce, were the fleece of her sheep, and the fabrics manufactured from it.

port; that the English sent to them upwards of 1200 sacks of wool, and a vast quantity of drapery of all kinds, which, at the most moderate rate, amounted in value to a million pounds sterling, and that they carried away from Antwerp goods—he does not say of what kind—to the amount of 14,000,000*l.*, to the great benefit of both countries, neither of which could possibly, without the greatest danger, dispense with their vast mutual commerce, of which," he continues, "the merchants on both sides are so sensible, that they have fallen into a way of insuring their merchandizes from loss by a joint contribution."—Chron. Rustic. vol. i. p. 103.

* Norwich in an especial manner profited by this. It had been rendered almost desolate by Kett's rebellion in 1549, but it now learned from the refugees to make those fine and light stuffs which have ever since gone by its name, and have restored it to more than its former prosperity.—Anderson on Commerce, ii. p. 126.

Gibson, in his continuation of Camden, says that, about 1722, stuffs to the amount of 700,000*l.* were sometimes manufactured in Norwich in one year.

† Meteren's Historia Belgica, lib. iii.

The refugees were located at first in the neighbourhood of the metropolis, and on the coast from Norfolk to Devonshire, but they spread by degrees over the principal part of the kingdom. The manufactures which were principally benefited by them were those of light cloth, in which the English had hitherto been lamentably deficient; and also in every description of worsted fabric. When the stocking-frame was afterwards introduced, they were the chief and the best workmen. The linen and silk trades also derived much advantage from them. The manufacture of bombazeens seems to have been at this time introduced, and carried on principally at Norwich. The trade of that town had, in the preceding reign, from the system of monopoly which was adopted, risen to almost an incredible sum, and it was now still further and most rapidly increased.

Two years before the accession of Elizabeth, three ships had sailed up the Baltic for the purpose of establishing a trade with Russia; they were hospitably received by the then Czar, John Basilowitz, who had lately conquered the Tartars of Casan, to whom the Czars of Russia had hitherto been tributary; and more lately he had added to his dominions Astracan and Nagaian Tartary. The advantage of supplying his half-civilized subjects with the manufactures of Western Europe were immediately evident to the Czar, and he listened with complacency to their promise of a second visit, and gave the adventurers a letter of licence to traffic in any part of his extensive dominions.

The prospect which this afforded of opening a new and profitable market for the woollen manufactures was not lost on the government of England, and a company was established under the title of "The Russian Company."*. For many a year it much benefited the woollen trade: the British woollen cloths and kerseys were bartered for raw silk, spices, and drugs, which were afterwards sold to good account.

This was the first exclusive corporation that was established; but it did the state service, and never degenerated into an oppressive monopoly. The name is still continued: a fine is exacted for admission into the Company, but each individual conducts his business as a private individual, and precisely as he would do if the Company was abandoned *.

If the reader now pauses for a moment and reviews the different facts that have been stated, the conclusion will seem inevitable, that until the period now under consideration—the reign of Queen Elizabeth—English wool was decidedly superior in quality to any produced on the Continent, except the Spanish; that the British manufactured cloth, and made of British wool, was not excelled in fineness or value by any other, excepting —and not always, or decidedly—the Spanish; and that the English wool was coveted abroad for the purpose of giving additional value to the finest fabrics. As to the nature of the manufactured goods exported there may be some doubt, for the majority of the English historians neither knew nor cared about the matter; but the weight of probability is, that they were chiefly made from the fleece of the short-woolled sheep, and the wool exported was from the long-woolled sheep. The British had for many centuries been able to compete with the manufacturers on the Continent in the goodness of their broadcloths, but had not yet learned the way to turn their unrivalled long wool to the best account.

A new era in the history of British wool now commenced. The market for the unwrought material was limited, or for a while annihilated, and the British merchant had to depend solely on the cheapness and goodness of his fabric. Foreigners had now arrived in England, whose superior skill

* M'Culloch's Dict., art. 'Russian Company;' Anderson on Commerce, vol. ii. p. 123, and Chron. Rust. i. p. 93.

would put the value of the British fleece to a fair trial, by improving to a certain degree the cloth that had hitherto been offered, and by bringing forward other fabrics, and composed of another material, and on which the native manufacturer had not dared to experiment to the extent of which the combing-wool was capable. The same chronological order will be pursued, and with the exception of the Stuarts, who seemed to be aliens to our country and its interests, it will be an onward course of improvement that will be described.

In 1581 another body of merchants was incorporated, under the title of "The Turkish Company." Through their means all the commodities of Greece, Syria, Egypt, Persia, and India, came home to us at a cheaper rate than they had hitherto been procured, and a profitable as well as extensive market for the sale of British goods was opened. This Company likewise did much service to the woollen trade, but it was not so securely based as the other, and, for any efficient purpose, soon died away.

In 1582 the export trade in manufactured goods was nearly doubled: 200,000 pieces of cloth were shipped. Three-fourths of these were carried into Germany, and thence found their way into Poland, Denmark, and Sweden. A part was still conveyed to the Netherlands and to France. In fact, the English woollen fabrics were now carried to every part of Europe, and everywhere they found a profitable sale. The exportation of wool was for a while suspended, for the Netherlands were not yet sufficiently at peace: but this was a matter of little consequence, for, the native manufactures flourishing, there was less wool for the foreigner. The state of the trade soon had its natural influence on the cultivation of the sheep: the flocks of the farmer increased, and the fleece was better, and better prepared; and when the Continental market was again open it was supplied with wool as before.

The Barbary, afterwards called the African Company, was instituted in 1585, and, still later, the Levant Company. Both of them were advantageous to the woollen trade: they were for many years conducted as fairly and liberally as chartered associations of this kind could well be, and at length were abolished during the reign of George IV.

In 1589 the stocking-frame was invented by the Rev. William Lea of Cambridge. Previous to this, even the superior classes of society wore cloth hose—cloth fitted, and sometimes rudely so, to the leg, and either gartered, as in the case of the Countess of Salisbury, or laced or buttoned; or, for the men, the breeches reaching to and fitting the foot rendered a stocking unnecessary. Knitting was at length introduced, but the knowledge of it was confined to few persons; and hose of that manufacture were seldom seen. A pair of knit silk stockings, manufactured in Spain, was presented to Queen Elizabeth by her silkwoman. This princess, who was not deficient in personal vanity, would never afterwards wear any others. Every full-length portrait of her represents her as dressed in her high-heeled shoes and black silk knit hose *.

It is not improbable that regal vanity might have contributed somewhat to the total neglect of this mode of manufacturing woollen or silk hose;

* The well-informed author of the Treatise on the Manufacture of Silk is witty and severe about these black silk stockings: "It might have been supposed," he says, "that Elizabeth's inordinate fondness for dress would have induced her to give every encouragement to this manufacture; but, content probably with her own acquisition, she might become desirous that the more becoming silken texture should remain a regal privilege; and while she displayed her own ancles in the delicate silken knit, she was perhaps well pleased that her maids of honour should conceal theirs under the clumsy and inelegant cloth hose, lest haply, among these, some might have been found more beautifully formed than her own."—Lardner's Cabinet Cyclopædia, vol. xxii. p. 24.

but when the ingenious machine of Lea was invented, it is incomprehensible that it should not have met with a single patron. He established some looms at Colverton, near Nottingham, but no one gave him encouragement. He applied to the queen, and met with a rude rebuff. Was the ruling passion still strong even in old age? He then listened to the invitation of the French king, and carried his looms abroad, but Henry IV. was soon after sacrificed, and poor Lea died a beggar*.

Some of Lea's workmen returned to Nottingham and successfully established themselves and their looms there. Worsted hosiery is now chiefly made in Leicestershire, silk in Nottingham and Derby, and cotton also in these two counties, and at Hinckley and at Tewkesbury; 33,000 frames are supposed to be at work, and 3,510,000 dozens are made every year†.

In 1600 the East India Company was established, and it has ever been a staunch friend to the woollen-trade and the wool-grower. It had the power to open an almost boundless market for English woollen goods‡. It early assumed, as the principle and guide of this division of its mercantile transactions, that, in the cloth which it exported, both the material and the manufacture should be British, and it has never deviated from this. When in 1828 Mr. Ireland, an extensive cloth manufacturer, was examined before the House of Lords with respect to the supposed deterioration of British wool, he said, "The East India Company is anxious to give as much countenance as they can to English growers, and they compel us to make some cloths entirely of British wool."

1608. James I. had now ascended the throne. The art of dyeing, as has been already seen, was perfectly known to the English manufacturer four hundred years before this date, but it had been utterly lost amidst the contentions by which the kingdom had been torn; and it was now the practice—a very strange one, when the woollen manufacture was in so flourishing a state in England—to send the white cloths into Holland to be dyed and dressed, and returned for sale. It was disgraceful, that they who surpassed all other countries in the fabric of the cloth, could not perform the finishing part at home. Some manufacturers and merchants reflecting on the great profit made by the Hollanders in this branch of the manufacture, (Sir Walter Raleigh states it to be 400,000*l.* per annum, and amounting, in the fifty-five years that it had continued, to nearly 20 millions of pounds,§,) and knowing also the king's profuseness, and his constant necessities, because he was unwilling to apply to the parliament for money, proposed to undertake the dyeing and dressing of the cloths on certain terms, leaving to the king the monopoly of the sale afterwards.

The proposition was a scandalous one, but James acceded to it, and issued a proclamation prohibiting the sending of any white cloths beyond the sea. The Hollanders and the Germans, as might be expected, resisted such a measure, and, in their turn, prohibited the importation of all dyed cloths. The speculator was therefore driven and confined to the home-market; but the cloths were not well dyed,—the charge for this bungling work was double what it used to be, and the project entirely failed.

* M'Culloch's Dict., art. 'Stockings.' † Ditto.

‡ Advantages of the East India Company are thus stated by Sir Joseph Childe:—"The East India Company takes off a considerable quantity of our native commodities and manufactures. It supplies us cheaply with the most necessary commodities for our own consumption; it brings us many commodities for our further manufacture; it furnishes us with large quantities of goods for foreign markets; it employs a great number of English shipping; it occasions the building of more ships of burden and force, fit for warlike services and the defence of the kingdom, than any other trade whatever; it brings in a considerable revenue to the king's customs, and the greatest addition to the kingdom's stock."

§ Sir Walter Raleigh's excellent Essay on Commerce.

The king was disappointed of his expected gains, and the English cloths were sent as heretofore to Holland to be dyed, and returned whence they came in order to be sold.

This, however, did not remain long. The folly and loss of such a proceeding was apparent to every mind, and the most strenuous efforts were made, and at length with a satisfactory result, to recall the lost art of dyeing.

In 1667 a dyer named Brewer came from the Netherlands with his workmen, and being well received and assisted by the government, he fully taught the English manufacturer the art of dyeing and dressing his white cloths, and thus made him perfectly independent of the Continent.

In the meantime, however, a very considerable improvement was made in the manufacture of woollen cloths by the invention of what are now called medley-cloths, different coloured wools being mixed together in the thread. Before this, the cloths had been of one uniform colour, and were dyed after they were woven. These medley-cloths were first made in Gloucestershire, and are still manufactured there in considerable quantities.

The woollen manufacture, although somewhat neglected by Elizabeth in the latter part of her reign, was left by her in a satisfactory and flourishing state. The greater part, or the whole of the wool which the country produced was employed in manufactures, either for home or foreign consumption; and one of the first acts of James was to prohibit the exportation of wool: but in the year 1622 there is the mortifying confession, under the sign manual, "that the cloth of this kingdom hath wanted both estimation and vent in foreign parts, and that the wools are fallen from their stated values, and trade in general is so far out of fame that the merchants and clothiers are greatly discouraged *".

The cause of this was, that the Hollanders and Flemings had been successful in their endeavours to revive their woollen manufacture, and many of the refugees had returned. There were continual contentions between the Merchant-Adventurers Company and the other traders and exporters; and in their eagerness to injure each other they sacrificed their common interest; and, most influential of all, from a false spirit of economy, and an erroneous view of the nature of their trade, they had refused to admit the superior foreign wools, which would now have improved their fabrics, and had bought up the coarse Irish and Scotch wools, by which their manufactures were deteriorated, and rendered almost unsaleable. James, an avaricious monarch, strangely magnified all these evils, that he might with better face impose new taxes upon his subjects in order to supply the supposed deficiency of the revenue.

In 1619 tapestry work was first brought into England by Sir Francis Crane, and James gave 2000*l.* for the building of a house at Mortlake, where this beautiful manufacture might be carried on †.

In 1625 Charles I. ascended the throne. He had fully as high ideas of his prerogative as his father possessed, and was more determinedly bent on upholding it; he, therefore, in the early part of his reign, had neither inclination nor time to patronize the manufacturing interest; and in the latter part of it, the trade and prosperity of the country were recklessly sacrificed by both the parties which were ranged against each other in unnatural contest. In the first year of his reign he too complained of the low state of wool, and the decay of the woollen trade; but he might be aiming at the object of his father—the increase of the revenue by new imposts.

* Rymer's Fœdera, vol. xviii. p. 40.
† Anderson on Commerce, vol. ii. p. 280.

The exportation of wool was forbidden. The prohibition was renewed five years afterwards, and it was ordained that all black cloths and mourning stuffs at funerals should be made from British wool alone. Two years afterwards, and after that, again and again, the prohibition against the exportation of wool was repeated with still severer penalties. This was a favourite object with the monarch; and he was determined to succeed. He likewise delivered up the whole of the trade to the tender mercies of the Merchant-Adventurers, and no manufactured goods were permitted to be sent to any other than their mart or staple towns; nor was any one allowed to trade within their limits under the penalty of forfeiture of their goods, unless they were freemen of the corporation. For these privileges the Merchant-Adventurers advanced at one time the sum of 30,000*l.* The woollen trade must have been a part and portion of the very life of the country, or it could not have survived, much less remained to a very high degree flourishing and lucrative under all these oppressions.

In 1646 the Sedan manufactory of fine cloth was established in France. It was patronized by the government; its founders were ennobled, and it flourished beyond all expectation. How striking a contrast with the abandonment, and treacherous sale of the staple, vital trade of Britain!

The Lords and Commons, when a six years' civil war had destroyed the power of the monarch, and crippled the resources of the kingdom, pursued the same course that Charles had commenced. "They wisely!" says Anderson, "and absolutely prohibited the exportation of English wool; they also issued a proclamation for supporting the privileges and charters of the society of the Merchant Adventurers of England, and our woollen trade at this time was in a very prosperous condition *."

The Commonwealth seemed disposed to take the woollen trade under its protection, but it was distracted by a variety of other objects, and little occurs in its short history which bears upon the present subject.

The reign of the second Charles commenced in 1660, and, as usual, with a proclamation against the exportation of wool and sheep, under the penalties of confiscation and imprisonment.

The second year of his reign, 1662, furnishes an unanswerable proof of the bad management of the commercial interests of the kingdom, and also of the expense and luxury which disgraced this reign.

The imports amounted to . .	£4,016,019
The exports to	2,022,812
Leaving a balance against the country of	£1,993,207

The continental governments took advantage of the supineness of the British, and in 1664 Colbert commenced a series of measures most injurious to the English commerce. He offered immunities and indulgences, and premiums and pensions to manufacturers and artists of every description, and from every country. A million of livres (50,000*l.*) were appropriated to the woollen trade alone. This plan could not fail of success. Numerous manufactories of fine cloth were established in Florence, and ere many years had passed, they were enabled to fabricate every kind of goods for which they were previously altogether dependent on the English.

In 1665 another pestilence occurred, equally fatal to the human being and the brute, and contributed yet more to depress the commerce of the country.

A singular but unexceptionable law was instituted in the succeeding

* Anderson on Commerce, vol. ii. p. 406.

year, and which would cause the consumption of no inconsiderable quantity of woollen stuff:—"That every person should be buried in a shroud composed of wool alone, under the forfeiture of 5*l.* to the poor of the parish." This law continued in force about 130 years.

In 1667, as has been already stated, the art of dyeing was once more introduced into England. The account of the customs in 1668 shows that, if the British manufactories were not continuing to decline, the balance of trade was increasing against England.

	£	s.
The imports in that year were .	4,196,137	17
The exports . . .	2,063,274	19
Balance against England .	2,132,864	18, nearly 140,000*l.*

more than it was six years before.

This, however, is principally to be accounted for by the unlimited trade that was then permitted with France. Her wines and her silks were poured into England almost without limitation, while she received few or no goods from England in return. The ruinous tendency of this was sufficiently evident. The trade with France was curtailed, or in a manner prohibited; and on the following, and during several successive years, although our exports did not much increase, yet the balance was considerably in favour of England*.

The Hudson's Bay Company, which was established in 1670, had little influence on the woollen trade, except the opportunity which it afforded of getting rid of an inconsiderable quantity of coarse goods.

The woollen trade continued to decline, partly from the inexcusable neglect of the Stuart government, and partly from the inconsiderate efforts of the landed interest to force the price of wool so high as necessarily to drive the British manufactures from the foreign market; and, most of all, from the establishment of manufactories in every continental state, equal, and in some places superior, to those in England. The monopoly of the trading world, which the chances of the times, and the prudent management of Elizabeth, had given to England, and which was the principal jewel in her crown, was now in a manner lost. Many and loud were the complaints of the merchants; one of them gives the following account of the commerce of 1675, under Charles II.—"The Dutch, long after they became independent states, knew not how to manufacture many of our woollen goods, and the knowledge of which we ourselves had learned from the Flemings, driven out by D'Alva's persecution, and we supplied the Dutch with vast quantities of fine cloth also, though mostly white, which they dyed and dressed, and exported to Germany and many other parts. We had also formerly the sole trade to Denmark, Norway, Sweden, Livonia, Poland, and Prussia; our exports to all which northern countries are greatly lessened by the Dutch having set up mighty woollen manufactures, and the Flemings renewed theirs. We had formerly the sole trade of woollen clothing to France, to the value of 600,000*l.* yearly, but now none at all; also the sole trade to Turkey, but of late the Dutch are become our competitors therein, and the French have been long nibbling at this trade; and in the Spanish trade both the French and Dutch largely share with us. What is yet more grievous, we continue to import much fine cloth from the Dutch, yearly sent there to be dyed. Formerly we had the sole trade to Portugal, but now the French and Dutch are our competitors, as they are also to Italy, where we used to supply all. The Venetians also manufacture and vend much cloth there†."

* King's British Merchant, vol. iii. p. 315, 316.
† Britannia Langsena, p. 157.

The year 1685, the first of the reign of James II., afforded a noble opportunity for the complete restoration of this important branch of English commerce. In this year the revocation of the Edict of Nantes, as it is incorrectly called, took place: it might be more truly said that enactments of new and unheard of severity were put in force against the professors of the Protestant worship in France; and all assemblies for the exercise of the reformed religion were forbidden under pain of death. To avoid the dreadful consequences of fulfilling the dictates of conscience, more than 600,000 persons left their native country, carrying with them a portion—in too many cases a small one—of their wealth, but all their industry and knowledge of the most valuable manufactures of the time. It might have been thought that a majority of these emigrants would have sought refuge in England, a country in which liberty and the Protestant faith were established, but the government of the Stuarts was short-sighted and imbecile; and James was more than suspected of an intention to restore the Catholic faith, and with it arbitrary power. No overtures of a kind reception and secure asylum were made to the refugees, while great privileges and immunities were wisely promised by Holland, Switzerland, and Germany; consequently the greater part of the outcasts fled to these countries, and only 50,000 found their way to England. They, however, greatly improved the lighter branches of the woollen trade, as well as that of silk, linen, paper, glass, and hats. In fifteen years the value of the woollen fabrics exported increased from 2,000,000*l.* to 3,000,000*l.* per annum, and at this amount, with occasional slight variation, they remained almost to the close of the eighteenth century. Mr. M'Culloch states, that "at an average of the six years ending with 1789, the annual official value of the exports was 3,544,160*l.* a year, being an increase of only about 540,000*l.* on the amount exported in 1700*."

It must not, however, be supposed that the whole British trade was at so low an ebb, and thus stationary. The population of Great Britain had rapidly increased, her wealth and her luxury had also grown in proportion; cloths of a finer texture began to be more generally worn, more and better cloth was manufactured, a greater number of sheep were bred, and, with the exception of a few and temporary reverses, the staple trade of England flourished at home.

The importance of the woollen trade to the farmer will be best seen by a reference to the number of sheep at various periods subsequent to 1688. No great reliance can be placed on the perfect correctness of some of the calculations, but they certainly approximated to the truth.

In 1698, Gregory King calculated that there were 12,000,000 sheep in Great Britain, and that the wool yearly shorn or felted, at the average of something more than 3*s.* a fleece, was worth 2,000,000*l.* The value of this he supposes was quadrupled in the manufacture of it, making 8,000,000*l.* Goods to the amount of not less than 2,000,000*l.* were exported, and the home consumption amounted to 6,000,000*l.* He, however, overrated the value of the wrought fabric, for it was not, on an average of the different cloths, more than three times that of the raw material.

In 1741, the number of sheep had increased to 16,640,000; the value of the wool was nearly 2,780,000*l.*, and that of the manufactured goods, supposing that all the wool was used at home (and from 1660 to 1825 the export of wool was strictly forbidden), was 8,340,000*l.*

In 1774, according to Arthur Young, the number of sheep was 25,589,754. The value of the wool was 4,264,959*l.*, and that of the manufactured goods 12,794,877*l.*

* M'Culloch's Commercial Dictionary, p. 1265.

According to the accurate calculation of Mr. Luccock, there were, in 1800, 26,148,463 sheep. The wool, from the now increasing weight of the fleece, amounted to 346,000 packs of 240 lbs. each; the value of it was nearly 6,000,000*l.* sterling, and that of the manufactured goods 17,500,000*l.* In 1828, Mr. Luccock's tables were corrected by Messrs. Goodman and Hubbard. These gentlemen, without making any material alteration in the estimate of the number of sheep, showed that the quantity of wool could not be much less than 384,000 packs, including skin and slaughtered wools, being an excess of nearly 70,000 packs on the production of 1800. Professor M'Culloch, in the last edition (1834) of his invaluable Dictionary, computes the number of sheep in the United Kingdom to be 32,000,000, the value of the raw material 7,000,000*l.* sterling, and that of the manufactured articles 21,000,000*l.*, and the number of persons employed in the manufacturing of these goods about 332,000. His calculation is as follows:—

Total value of manufactured articles . . .		£21,000,000
Value of raw material	£7,000,000	
Oil, soap, dye-stuffs, &c.	1,450,000	
Wear and tear of capital, profits, &c. . .	4,250,000	
Wages of 332,000 persons, on an average of 25*l.* each	8,300,000	
		21,000,000*

These items require very considerable modification. The whole calculation is framed on the erroneous supposition that the processes of the manufacture treble the value of the raw material, whereas, regarding the whole of the woollen trade, the value is not more than double. Then the value of English wool only is taken, and not the combined value of the home growth and of foreign imports. A more accurate estimate of the value of the woollen trade, in 1834, would probably be as follows:—

108,000,000 lbs. of English wool, at 1*s.* 3*d.* per lb. . .		£6,750,000
46,535,232 lbs. of imported wool, at 2*s.* 6*d.* per lb. . .		5,806,904
		12,556,904
Wages of 350,000 persons, at 25*l.* each		8,750,000
Dye-wares, oils, and other raw materials		1,450,000
Wear and tear of sunken capital, profits, &c.		4,250,000
Total value of manufactured articles . .		27,006,904

In looking over these estimates three things will probably attract the attention of the reader, namely, the fewness of the persons employed in the manufacture; the decrease of the expense of manufacturing, it being little more than the value of the raw material; and the high rate of wages, 25*l.* per head, in a trade that employs so large a proportion of children.

These results are referrible to one main cause—the introduction of machinery, by means of which all the processes of the manufacture have been rendered cheaper and more perfect, while the greater amount of production, in proportion to the number of hands employed, allows of a large addition to the wages.

Smith, in his "Memoirs of Wool," has shown that, about A.D. 1738, the average earnings of the operatives engaged in the woollen trade, and including men, women, and children, were about 6*s.* 8*d.* per week. They are now about 12*s.* Even allowing for the different price of agricultural produce, the present wages will command a far larger share of comfort and enjoyment than at any former period.

The influence of machinery may be estimated from this fact, that taking the rate of production in 1738 as a basis, it would require 1,500,000

* Dictionary of Commerce, p. 1266.

persons to work up the annual growth and importation of wool into cloths. The same work is now done by 350,000, and a new manufacture has been introduced, that of cotton, which, notwithstanding the advantage of machinery, employs, at the present day, more than 1,500,000 persons, at the modern rate of wages. Therefore, not only have our national productions been incalculably multiplied by the use of machinery, but the wages and comforts of the operatives have been increased.

The export trade in woollen goods has of late years materially increased from the greater number and population and wealth of the British colonies, and more particularly from the greater fineness of the material employed, and the consequent augmented value of the fabric. The exports of woollen cloths amounted, in 1789, to 3,554,160*l.*, official value; in 1829 they had risen to 5,372,490*l.*; and in 1833 they were 7,777,952*l.*

As the population and the commerce of the United Kingdom increased, it was necessary that the material to be manufactured and the food of the workmen should proportionably increase, and hence the number of sheep in 1698, amounting to 12,000,000, and yielding one description of food and material, arose in 1833 to 32,000,000. A limit to this, however, would necessarily be found in process of time, for the area of the country could not be enlarged, nor, on the old system, could more than a given number of sheep be kept on a certain space of ground. Thence arose a new system of husbandry—the artificial or turnip husbandry—by means of which a regular supply of food is provided for every season of the year, and double, or occasionally treble the number of sheep can be kept. With this was connected the possibility of fattening them more expeditiously, and of fattening them to a much greater extent than before, or, in other words, materially increasing the size of the breed. A larger breed of sheep was almost everywhere preferred and encouraged: they paid better. There was, however, a consequence of this, which had not been taken sufficiently into account. If the carcase increased in weight, so would the fleece; the staple would be longer, and the fibre would be larger. The manufacturer was the first to find out the change. The farmer had not contemplated it, nor would he for a while believe it when it had taken place in his own flock, and for many a year he continued stoutly to maintain the superiority of the British fleece over that of every country of the world. The consumer, however, decided the matter in a very summary way. The goods which used to obtain a ready sale, and which were once preferred to those of every other country, could not be disposed of at all; no not in the district in which the wool was grown. The purchaser would have a cloth fabricated of Spanish wool only, and consequently the English wools were, for clothing purposes, materially lessened in value. That which was once a carding was become a combing wool, and useful and valuable for a very different purpose. *It had not deteriorated, but it had changed.* The proof of the alteration in the character of the British wool has already been stated in page 71, to which the reader is referred. There can be no dispute about the matter*.

* There are some admirable remarks on this subject in one of the Agricultural Reports in the Quarterly Journal of Agriculture, 1828-9. "It follows almost as a consequence from the progressive improvement of our different varieties of sheep, that the wool should have somewhat declined in quality, for they who have experience in the practice of breeding improvements, know that attention is more frequently directed to the size, symmetry, and fattening properties of the animal, than to the quality of the fleece. The comparative high price of this kind of wool caused a great extension of the South Down breed of sheep, and its importation into districts very different from those that were suited to the habits of the animal. Not only were these sheep thus extended over the country, but in numerous cases they were subject to crossing with other and

It was not in England alone, but in almost every other country that the fleece had grown longer and coarser, and this brought into notice a wool which had never been sufficiently appreciated in Great Britain—the Spanish wool—finer, perhaps, than that of England had ever been—most certainly than the British wool had now become. To this was added the influence of fashion and caprice, and the general determination not only to reject the coarser wool that was now grown, but to demand a finer cloth than ourselves or our ancestors had been accustomed to wear. The manufacturers were compelled to have more general recourse to this wool. Previous to 1800, the importation of it had not exceeded 3,000,000 lbs. annually, but it rapidly increased to 8,000,000 lbs. or 9,000,000 lbs. A new market being afterwards opened in the heart of Germany, and at which a still superior quality of it might be purchased, the importation augmented to the almost incredible quantity of 36,000,000 lbs.

The sheep-owner suffered, and materially so; his wool sunk to a third or a fourth of its former price, and in many cases he could scarcely sell it at all. He appealed to the government, and a duty was laid on the importation of foreign wool. This duty was gradually increased until it amounted almost to a prohibition. That was bad policy, and very different were the results from those that had been anticipated. The duty operated as a premium on foreign manufactures. The capital and labour which had been employed in the export woollen trade became idle; simply because this duty precluded all successful competition with France and Flanders, while the perverted taste of the home-consumer, who still would have a cloth made of Spanish or Saxony wool, kept down the demand for English wool. It began to be discovered, as already stated, that, although the British wool had changed its character, and had become longer and coarser, and was rapidly, and at last, become altogether excluded from the manufacture of fine cloths, the very length which it had acquired made it available for other purposes, and those not few or unimportant, and in them it began to be employed.

The legislature of the country then did its duty, and will deserve the grateful remembrance of posterity. Unawed by popular clamour, it threw the wool trade altogether open. The consequence was, that although the foreign wools again crowded our markets, they gave employment to thousands of artificers, who had been suffering the most dreadful privations: they suffered the British manufacture once more to compete with the foreign one. The British short wools, having a new situation and use assigned to them, again looked upwards; they were employed in the manufacture of worsted goods: they were permitted to be exported, which soon raised up a very important trade in wool and yarns, and which has been annually and rapidly increasing. The fact is, that there has been of late years a demand

heavier breeds, and this to such a degree, that pure South Downs are known to form a comparatively small part of the animals that now pass under that name. It cannot be doubted, then, that the South Down wools have in the mass been greatly changed in quality, although many instances may be produced, in which the purity of the wools has been preserved, or even increased by particular breeders.

"But even though the wool of the South Down sheep were as valuable as ever, can it be shown that its quality is as good as that of foreign wools? Can cloths which are saleable in the foreign market, be manufactured of English wool, or can any considerable portion of English be permitted to enter at all into the material, either for home use or foreign supply? Then what right have the wool-growers to demand that the manufacturers of the country shall not be permitted to procure the materials of their manufacture where they can be obtained the cheapest and the best? or what can be thought of the justice of not only not permitting them to exercise this natural and necessary right, but of compelling them to take from the wool-growers what is found to be absolutely unsuited to the purposes of commerce?"—Quarterly Journal of Agric., vol. i., p. 371.

for long wools quite equal to the supply. The whole supply of England has not been more than adequate to the supply of the home and foreign trade; and, by natural consequence, has not only risen in price since the duty on foreign wool was taken away, but now bears a full remunerating price. At the present time (March, 1836) hogget wool is quoted from 1*s.* 10*d.* to 2*s.*, and clothing wool from 1*s.* 4*d.* to 1*s.* 8*d.* per lb., a price which the agriculturists, examined before the Lords' Committee, acknowledged was a remunerating one to the farmer; and, in addition to this, is the increased weight of the fleece, and that of the carcase too.

Both the domestic consumption, and the exportation of woollen goods, have annually risen. The exports, by far the most valuable consideration, have increased nearly 3,000,000*l.* within the last ten years; and at no period in the later history of the country was the woollen trade in a more flourishing condition. There needs only somewhat more attention to the improvement of the fleece in the Australian colonies, and, perhaps, somewhat more encouragement from the mother-country, in order once more to render this manufacture, in all its ramifications, what it was in the olden time, the sure basis of national prosperity and wealth.

The establishment of the cotton manufacture, about 1780, somewhat retarded the progress of the woollen trade. The manufacture of cotton goods to the amount of 34,000,000*l.* of money annually, and the employment of 1,500,000 persons, while they opened a new and most prolific source of wealth, could not fail of producing some injurious effect on the manufacture and consumption of wool. After a very short period, however, good began to spring out of evil. Good, permanent in its nature, and far exceeding the extent of the temporary evil. With the establishment of the cotton manufactory came the introduction of steam power. The steam-engine was brought to a high state of improvement by Watt. The carding and the spinning machines of Arkwright and Hargreaves were adopted in every cotton factory. They were applicable to every manufacture, even to that of wool; the fibres of which required more manipulations than those of cotton, in order to render them available for every useful purpose. The introduction of machinery in the fabrication of woollen cloths was somewhat slower, but equally assured in its progress; and the improvement in the woollen trade which took place towards the close of the last century is unquestionably to be attributed to this cause.

There is one result of machinery, of great importance to the agriculturist, which must not be forgotten. As by improved machinery the cost of the manufacture is reduced, the demand for the raw material is increased; and, contrary to its effect on the price of the finished article—that is, to lower it—machinery, in proportion to the extent to which it is introduced, and the perfection to which it is carried, will enhance the price of the raw material. Every year machinery is advancing towards perfection, and as some article can be better and cheaper made, the demand for the raw material will proportionably increase, the manufacture will approach nearer to the supply, and the price of it will be correspondingly and permanently increased.

Neither the wool-grower, nor the woollen manufacturer, however, must raise his expectations too high. The export of woollen goods since 1800 has increased; but they have not done so in anything like an equal proportion to that of cotton goods. In fact, the British manufacturer is only second in the production of fine woollens, and it is more than doubtful whether his fabrics can bear a comparison with those of France and Flanders. Twenty years of peace, and of intercourse with this country, have enabled the continental manufacturer to make rapid strides in improvement, and it

The following Table of the different kinds of Woollen Manufactures in 1833, and the places to which they were sent, will neither be uninteresting nor uninstructive. It is taken from M'Culloch's invaluable Dictionary of Commerce, a book which should find a place in the library of every commercial, and almost every agricultural man.

Countries to which Exported.	Cloth of all sorts.	Napped Coatings, Duffels, &c.	Kerseymeres.	Baizes of all sorts.	Stuffs, Woollen or Worsted.	Flannel.	Blankets and Blanketing.	Carpets and Carpeting.	Woollens mixed with Cotton.	Stockings, Woollen or Worsted.	Sundries. Hosiery, Rugs, Coverlets, Tapes, &c.	Declared value.
	Pieces.	Pieces.	Pieces.	Pieces.	Pieces.	Yards.	Yards.	Yards.	Yards.	Doz. Pair.	£.	£.
Russia	4,891	131	551	9	28,309	11,009	1,060	13,432	558	268	431	93,672
Sweden	29	..	2	..	4,222	140	328	325	300	126	46	5,212
Norway	652	15	72	125	3,265	3,075	1,550	60	2,589	608	308	12,321
Denmark	42	..	25	8	885	2,215	180	1,596	..	85	134	2,634
Prussia	3	..	1	..	10	500	..	..	..	70	26	150
Germany	17,790	5,530	13,562	486	451,922	312,860	5,638	68,596	297,654	5,763	6,638	634,916
Holland	13,669	9,929	964	10,912	69,971	550,789	5,796	28,613	34,479	18,586	1,475	282,123
Belgium	1,051	1,886	1,035	1,955	38,978	134,452	7,450	9,126	212,055	17,185	1,880	108,633
France	2,937	161	80	279	20,268	16,955	2,240	7,675	26,517	237	642	55,944
Portugal, Azores, and Madeira	13,329	238	759	6,637	20,061	7,725	5,486	6,426	68,786	410	1,976	149,358
Spain and the Canaries	2,987	19	507	949	49,903	10,793	7,700	8,705	19,174	858	824	111,970
Gibraltar	1,932	10	437	98	1,918	12,395	2,000	1,476	13,761	496	344	19,436
Italy	12,483	..	647	17	90,337	10,793	4,924	40,761	79,379	2,137	1,485	220,512
Malta	977	..	139	..	3,917	4,220	2,850	400	2,604	35	380	12,468
Ionian Islands	130	16	33	19	284	605	70	516	498	152	141	2,919
Turkey and Continental Greece	1,134	63	34	18	5,960	6,980	50	13,840	1,260	272	309	20,102
Morea and Greek Islands	63	..	..	..	70	307	..	..	..	..	..	914
Guernsey, Jersey, Alderney, and Isle of Man	2,345	76	4	235	3,625	37,552	13,463	15,530	195	786	1,622	35,722
East Indies and China	127,696	..	370	24	199,665	76,625	21,830	2,484	64,164	1,777	2,405	961,333
New Holland	3,453	78	320	139	4,482	21,421	164,626	11,110	12,510	3,551	1,569	54,182
Cape of Good Hope	4,163	612	690	1,190	6,898	30,048	16,809	2,537	4,981	799	599	42,604
Other parts of Africa	252	1	91	111	1,032	8,351	3,200	120	..	417	1,312	7,189
British Colonies in North America	38,547	231	355	348	61,454	501,215	277,645	147,933	45,763	23,388	17,677	376,878
Ditto West Indies	7,981	415	225½	5,480	14,457	53,380	107,131	1,449	5,978	2,572	6,836	102,101
Foreign West Indies	6,025	..	73	134	8,870	10,676	139,770	5,855	10,050	115	1,347	59,848
United States	271,503	96	2,217	474	511,701	211,157	2,239,219	220,873	445,942	148,615	20,594	2,265,407
Brazil	24,190	36	801	13,310	50,770	5,530	73,562	4,454	148,312	190	3,902	274,569
Mexico and South America	36,934	..	2,079	2,079	37,325	13,957	23,529	53,485	107,547	3,267	3,317	382,516
Total	597,189	19,543	31,795½	45,036	1,690,559	2,055,072	3,128,106	667,377	1,605,056	232,766	78,236	6,294,432

is questionable whether even in the cotton manufacture the islander can claim any high precedence and superiority. There is, however, no cause for alarm: competition is a powerful stimulus; and, in proportion as his continental rivals approach to his grade of excellence, the British manufacturer must likewise exert himself. At the worst, as the inhabitants of the continent improve in arts and manufactures, they will grow in population, and it is not now to be proved that rich neighbours are generally good customers. The old Machiavellian principle, that in order for one nation to prosper it must keep down and impoverish its neighbour, is now deservedly exploded.

It is not easy to describe in what manner the different manufactures are located in the various districts of the kingdom; the following, however, may not be a very incorrect sketch.

Woollen cloth in Leeds and its neighbourhood, Wakefield, Huddersfield, and Saddleworth. Superfine cloths at Stroud in Gloucestershire, Bradford in Wiltshire, Trowbridge, Warminster, Frome, and in various parts of Dorsetshire. Coarser cloths at Halifax, Taunton, and Shepton Mallet. Mixed cloths in the neighbourhood of Leeds, on the east and the north. Woollen cloths of thin texture at Wilton. Flannel at Halifax, different parts of Gloucestershire, the whole of North Wales, and the neighbourhood of Oswestry. Baizes at Halifax, Colchester, Barking, Braintree, and Rochdale. Blankets about Leeds, Huddersfield, and Dulverton. Flushings about Leeds, Huddersfield, and Godalming. Stuffs at Bradford and Halifax. Light stuffs at Norwich. Kerseys at Saddleworth. Druggets in Devonshire and at Kendal, Ambleside, Keswick, Andover, Basingstoke, and Alton. Long ells in Devonshire. Plush at Modbury. Fine camlets, worsted shawls, crapes, and buntings at Norwich. Woollen yarn in Suffolk, and in some parts of Lancashire. Carpets at Kidderminster, Wilton, and Axminster. Rugs at Burford. Shalloons and serges about Andover, Basingstoke and Alton. Stockings, socks and gloves in Montgomeryshire, strong cloth in Merionethshire, and small cloth in Denbighshire.

The author cannot close this sketch of the rise and progress of the British woollen manufactures, without once more thanking his valued friend, Mr. Thomas Plint, for much useful aid.

Chapter VII.

THE MIDDLE-WOOLLED BREEDS OF SHEEP.

The reader will not forget that the *short wools*, those used exclusively in the manufacture of fine cloths, are now all of foreign growth; and that by the term *middle-wools* were meant the South Down, Norfolk, Dorset, Ryland, Cheviot, and other fleeces, which occupy an intermediate station between the short wools of Spain and Germany, and the long wools of Leicester and Lincoln. They are in fact the old English *short* wools, materially diminished in quantity by the various crosses between the old short and long woolled breeds, which are multiplying in many parts of the kingdom. For the sake, however, of being better understood, the old distinction between the long and the short wools shall again be recognized while the British sheep are described.

There is reason to believe that the wool which attracted the attention of the Romans, and was employed in the first manufactory at Winchester, was short wool. With the exception of some of the lower and richer districts

of Devon, Somerset, Kent, and Essex, the eastern, and southern, and western coasts of England—extending from the mouths of the Nen and the Ouse to the northern boundary of Wales, and reaching over many an inland county, many a long range of hills, and terminating only at the extremity of the Highlands of Scotland—have been almost exclusively occupied by short-woolled sheep, differing considerably in various points—some horned, and others polled—some domesticated, and others wild—yet, when carefully examined, betraying an evident identity of origin.

Fifty years ago, there was not a county in England in which some of the short-woolled sheep were not found, and in the majority of the counties they were the prevailing breed: it is natural, therefore, that they should first pass in review.

It would be waste of time now to search for the parent stock. It has in a manner disappeared even in the wilds of Devon and Cornwall; and no long period of time will elapse ere it will be sought for in vain amidst the mountains of the North. A better and more productive system of husbandry has introduced and established a different, a larger, and a better breed of sheep; but some of the features of the primitive race remain, and will be traced with considerable interest.

It will be advantageous to start at that district in which, all circumstances being considered, the best breed of middle-woolled sheep is now found.

The South Downs are a long range of chalky hills, diverging from the great chalky stratum which intersects the kingdom from Norfolk to Dorchester. They enter the county of Sussex on the west side, and are continued almost in a direct line as far as East Bourne, where they reach the sea. They may be considered as occupying a space of more than sixty miles in length, and about five or six in breadth, consisting of a succession of open downs, with very few inclosures, and distinguished by their situation and name from a more northern tract of similar elevation and soil, passing through Surrey and Kent, and terminating in the cliffs of Dover, and of the Forelands. On these downs a certain breed of sheep has been cultivated for many centuries, in greater perfection than elsewhere; and hence have sprung those successive colonies, which have found their way to every part of the kingdom, and materially benefited the breed of short-woolled sheep wherever they have gone *.

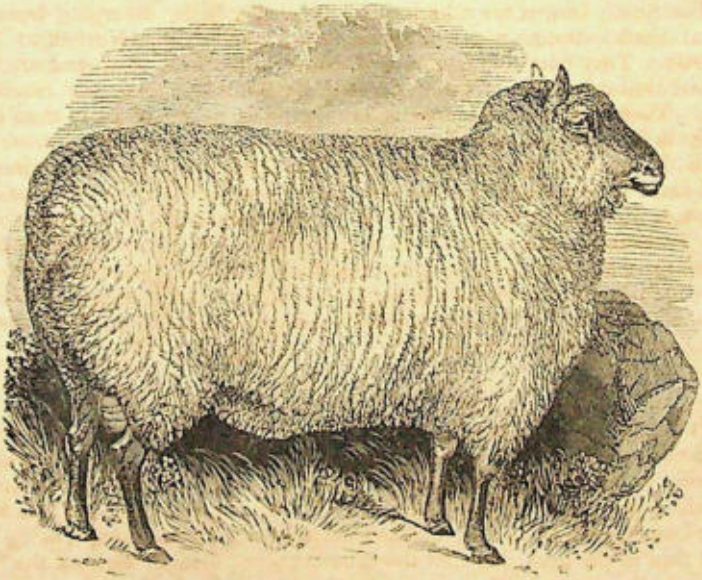
THE SOUTH DOWNS.

It is only lately, however, that they have been brought to that degree of perfection which they at present exhibit. Their zealous advocate, and the breeder to whom they are indebted more than to any other for the estimation in which they are now justly held, Mr. Ellman, says of them—"This breed was formerly of a small size, and far from possessing a good shape, being long and thin in the neck, high on the shoulders, low behind, high on the loins, down on the rumps, the tail set on very low, perpendicular from the hip-bones, sharp on the back—the ribs flat, not bowing, narrow in the fore-quarters, but good in the leg, although having big bone †." Arthur Young, who saw them in 1776, thus speaks of them—"Fine wool is certainly a very considerable object, provided it is gained on a well-formed carcase; but if a fine coat is procured at the expense of a thin chine, low fore-end, and rising back-bone, the advantage is purchased too dearly. The faults most common in the South Down breed are these three. They are found very general even in the best flocks, inasmuch as not more than one sheep in

* Luccock on Wool, p. 257.
† Baxter's Library of Agricultural Knowledge, p. 452.

a hundred, perhaps in two hundred, is to be seen tolerably free from them *."

Since that time they have materially improved, yet not by any admixture of foreign blood, for even the cross with the Leicesters was a failure, and the promised advantages to be derived from the Merinos were delusive. The sheep-owners began better to understand, and carefully to practise, the true principles of breeding. The "sorting" of their flocks was no longer left to the menial; the sexual intercourse of the sheep was no longer a matter almost of chance-medley; but a system of selection was adopted and sedulously followed. In addition to this, as has been already remarked, there was a great improvement in agriculture generally. The introduction of the turnip-husbandry enabled the farmer to keep more sheep on the same quantity of land, and to keep them better, and, in fact, to feed them up earlier and more certainly to that development of form and utility of which they were capable. "They are now," says Mr. Ellman, "much improved both in shape and constitution. They are smaller in bone, equally hardy, with a greater disposition to fatten, and much heavier in carcase when fat. They used seldom to fatten until they were four years old; but it would now be a rare sight to see a pen of South Down wethers at market more than two years old, and many are killed before they reach that age †."



South Down Ram.

For an account of the most perfect form of the South Down sheep, the reader is referred back to p. 111 of this Treatise, where a description is

* Annals of Agriculture, vol. xvii., p. 231.

† Library of Agricultural Knowledge, p. 452. It is an act of justice to Mr. Ellman to record what Arthur Young, in one of his later tours, says of the concern which this gentleman had in effecting all this improvement. "Mr. Ellman's flock of sheep, I must observe, in this place is unquestionably the first in the country, the wool the finest, and the carcase the best proportioned: both these valuable properties are united in the flock at Glynde. He has raised the merit of the breed by his unremitting attention, and it now stands unrivalled."—Annals of Agriculture, vol. xx., p. 224.

given of what a hill or down sheep ought to be; and to which may be added, that this animal has a patience of occasional short keep, and an endurance of hard stocking scarcely surpassed by any other sheep *, an early maturity not inferior to that of the Leicesters, the flesh finely grained, and the wool of the most useful quality.

The South Down sheep are polled; but it is probable that the original breed was horned. It has been shown that the primitive breed of sheep was probably horned. The ram that was sacrificed by Abraham, instead of his son, was entangled in a thicket by his horns; and it is not unusual to find among the male South Down lambs some with small horns.

The dusky or sometimes black hue of the head and legs of the South Downs not only proves the original colour of the sheep, and perhaps of all sheep, but the later period at which it was seriously attempted to get rid of this dingy hue. In almost every flock, notwithstanding the great care which is now taken to prevent it, several parti-coloured lambs will be dropped; some with large black spots, some half black, and some entirely black. A writer in the "Annals of Agriculture" states, that "he has frequently had twelve or fourteen perfectly black lambs, although he never kept a black ram or ewe." From this he draws the conclusion, that their original colour was black; that art alone produced the white wool; and that, if the best of the South Downs were left in a wild state, they would in a few years become black again †.

Arthur Young computed the quantity of sheep-ground on the Downs at 150,000 acres—it was much more than that—and the number of sheep at 270,000 in summer, and 220,000 in winter. Mr. Luccock calculated that not less than 864,000 of these animals occupied the hill and the underhill grounds; a rate of stocking which is not exceeded in any other part of England, marsh-land alone excepted, and which is only to be accounted for by reason of the great quantity of artificial food which is raised on the arable part of every farm. All the sheep farms have a very considerable quantity of arable land attached to them. Messrs. Kennedy and Grainger, in their valuable work on the tenancy of the country, calculate that a farm carrying 1000 ewes would consist of 600 acres of arable, and 600 acres of down; and the arable land held under the same restrictions as in the other parts of the country. Sheep are, therefore, necessary, in order to feed on the otherwise almost useless pasture of the downs, and also to contribute by their dung to the productiveness of the arable ground; and, on the other hand, arable ground yields the principal part of the winter and early spring food of the sheep. One reason that the Leicesters never succeeded on the downs was, that they would not bear to be driven two or three miles twice every day, from the fold to the pasture, and from the pasture to the fold.

The artificial food most in use in the beginning of spring, and soon after lambing, is green rye; but it must be cautiously given, or it will occasionally scour the sheep, and produce fatal inflammation of the bowels. This, however, is prevented by removing the ewes for a few hours once in the day to old pasture ground, and never folding them on the rye during the night. The rye being fed off, or running to seed at the latter end of May, is ploughed for turnips, or for rape.

Rye-grass succeeds to the rye, and affords excellent food until the latter end of June, when the winter tares will follow. These, according to Mr.

* Arthur Young, speaking of the South Downs in 1788, says, "I know of no lands in the kingdom, rich marshes excepted, which are stocked in such a proportion. Mr. Ellman, on 500 acres, has 700 ewes, lambs, and wethers, in winter; and 1450 of all sorts in summer, besides 140 head of cattle."—Annals of Agriculture, vol. ii., p. 170.

† Annals of Agriculture, vol. xxii., p. 242.

Ellman, may be sown from the beginning of October to the beginning of the May following; so that one crop may follow the other as it may be wanted.

Tares, clover, or rape, come next in order. The tares are probably not so good as the clover or rape: but this depends much on the situation and soil of the farm. Lastly, for winter-food, come the turnips, of which the sheep-owner should be careful always to have a sufficient quantity. The Swedes are preferable, if they can be sown sufficiently early, and will last until the lambing time; but they should not be given afterwards, for the lambs do not always thrive upon them.

There are no sheep more healthy than the South Downs. They seldom suffer from the hydatid on the brain, nor, on the majority of the farms, are they so much exposed to the rot as in many other districts. Their general health may be much connected with this frequent change of food, and their periodical journeys to and from the fold *.

The rams are usually put with the ewes about the middle of October, and remain with them three or four weeks. The careful breeder, where his farm will admit of it, puts only one ram to a certain number of ewes in each enclosure; about forty to a lamb ram, and eighty to one fully grown. He thus knows the progeny of each ram, a circumstance of no little importance with regard to the improvement of the breed. At the end of the third or fourth week the whole flock is again put together; two or three rams being left with them in case any of the ewes should still remain at heat.

It is believed that the treatment of the ewes at this time has considerable connexion with the number of lambs which they will produce. If they are well kept, a considerable proportion of them will probably have twins. It is possible that the stimulus of plentiful and nutritious food may have some influence on the number of the lambs; but if the farming arrangements of the sheep-breeder should render it desirable for his stock thus rapidly to multiply, he would be most likely to accomplish his object by breeding from rams and ewes that were twins. No fact can be more clearly established than an hereditary tendency to fecundity.

The Sussex farmers usually set an example of humanity to those in many other districts, in the care which they take of the ewe at the time of yeaning. She is driven home, or there are sheds or sheltered places for her constructed in the field, and the loss, as it regards the mother or the lamb, is comparatively light; while the owner has the satisfactory reflection that these valuable animals have not been cruelly abandoned at a time of suffering and danger.

The stock of the Sussex sheep-breeder does not often contain many wethers. The wether lambs, if not sent to the Weald, are usually sold when about six months old, and the ewes are always disposed of at four or five years old, and before they have begun to loose their teeth. Very large lambs are certainly often procured from old ewes, but they do not fatten so well as those that are yeaned by younger sheep. The average price of the lambs is from 12*s.* to 15*s.*, and of the draught ewes from 18*s.* to 24*s.* The wethers that are kept have a greater quantity of grass, and fewer turnips, than is the practice with most other breeds; but the greater part of them, and sometimes the whole number, are sent to the small farmers in the Weald, in order to be kept during the winter. The number of South Down sheep sent for the supply of the London market has for many years past been regularly increasing; and, while the quality of the flesh pleases the customer, they are generally admitted to be the best *proof* sheep that are brought to Smithfield.

* Library of Agricultural Knowledge, p. 456.

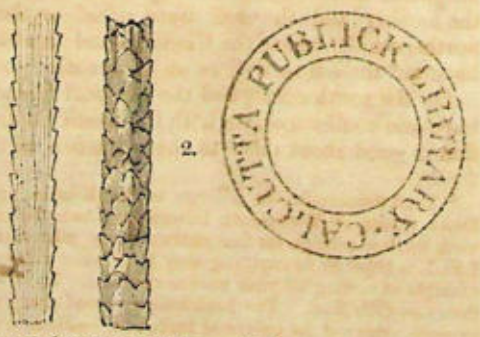
The average dead weight of the South Down wether varies from 8 to 11 stones; but Mr. Grantham exhibited a pen of three sheep in the last show of the Smithfield Club (1835), one of them weighing 20 stones, 3 lbs.; a second, 20 stones, 6 lb.; and the third, 21 stones.

The average weight of the fleece of a South Down hill sheep was stated by Mr. Luccock, in 1800, to be 2 lb.: it has now increased to 3 lb. The fleece of the lowland sheep, that used to be 3 lb., is now 3½, or even 4 lb. This is the natural consequence of the different mode of feeding, and the larger size of the animal. The length of the staple in the hill sheep rarely exceeded 2 inches in length, and was oftener not more than 1½ inch: it is now more than 2 inches, and in some of the lowland sheep it has reached to 4 inches. The number of hill sheep had rather decreased since 1800, and those in the lowlands had materially so; but now that South Down wool is once more obtaining a remunerating price, the flocks are becoming larger than they were. The colour of the wool differs materially, according to the colour of the soil. The shortest and the finest wool is produced on the chalky soil, where the sheep have to travel far for their food; but there is a harshness and brittleness about this wool which was always seriously objected to.

The principal mart for wool is at Lewes. There is a stock-market every fortnight, to which the farmers resort from almost the whole range of sheep-pasture in the county. The wool-staplers meet them there; and, knowing the stock of most of them, occasionally make their bargains. The great wool fair is on the 26th of July. The farmer attends for the avowed purpose of selling, and the price for the ensuing season is then nearly fixed: yet few bargains are actually made; and the stapler is afterwards obliged to take his round among those with whom he usually deals.

The microscopic appearance of the South Down wool is delineated in page 90. The fibre is the six-hundredth part of an inch in diameter; that of the Saxony wool being but the eight-hundred-and-fortieth part. The serrations are only 2080 to an inch; while in the Saxony wool 2720 were observed in the same space.

Subjoined is a prime specimen of Picklock South Down wool. The diameter of the fibre, and the number of serrations is precisely the same; but in the opaque object the cups are roughened, irregular, and some of the leaves have exceedingly short angles; and in the transparent one, although the serrations seem to be more regular, they are also more deeply toothed, and some of them have a kind of hooked appearance. This difference of structure well explains the superior felting quality of the Picklock wool, when compared with the common specimens.



1. *A fibre of the wool viewed as a transparent object.*
2. *Ditto, an opaque one.*

This greater comparative bulk of the fibre, and paucity of serrations, will account for the harshness and want of felting property which have been considered as defects in this wool. The brittleness of the pile is perhaps to be attributed chiefly to the soil. The clothiers were always careful not to use too much of it in the making of their finest cloths. When most in repute, the South Down was principally devoted to the manufacture of servants' and army clothing, or it was sparingly mixed with other wools for finer cloth. Now, however, when it is materially increased in length, and become a combing wool, and applicable to so many more purposes than it was before—now that it enters into the composition of flannels, baizes, and worsted goods of almost every description—its fineness and its felting, compared with some of the other short wools, renders it a truly valuable article. The South Down sheep-master justly repudiates the charge of its deterioration—*it has only changed its character*—it has become a good combing wool, instead of an inferior carding one; it has become more extensively useful, and, therefore, more valuable; and the time is not far distant when the sheep-owner will be convinced that it is his interest to make the South Down wool even longer and heavier than it now is *.

One species of South Down wool has decidedly improved—the hogget wool, or that which is left on the sheep untouched until the second shearing time. This was always used as a combing wool; and its increased length, since the present system of sheep management has been adopted, adds materially to its value. It is finer than the long wools—it has more feltiness about it, and it is applicable to more numerous and profitable purposes.

The practice of letting and selling rams was more prevalent and more profitable among the breeders of the South Down sheep than of any other kind, except the Leicesters. At the sheep-shearing at Woburn, in 1800, a South Down ram, belonging to the Duke of Bedford, was let for one season at 80 guineas, two others at 40 guineas each, and four more at 28 guineas each. This practice has been of later years pursued extensively and profitably by Messrs. Ellman, Grantham, Todd, and others.

Two years previously to this the Emperor of Russia bought two of Mr. Ellman's rams, in order to try the effect of the cross on the Northern sheep. The Duke of Bedford, at the request of Mr. Ellman, put a price upon them, observing that he did not wish to charge a foreign sovereign, who had done him so much honour, more than any other individual. The price fixed by the Duke was 300 guineas for the two, and he purchased two more for himself at the same rate †.

The pure South Downs have penetrated to almost every part of the kingdom, and everywhere they have succeeded when care was taken that the locality and the soil were suited to the breed; except that on the northern hills, where the Cheviots and the black-faced sheep wander, they have not thriven so well as on their native downs.

On the south coast, and the adjacent inland counties, the sheep seem to have one common origin with the South Downs, or evidently owe almost all that is good about them to the influence of this valuable breed. The best

* Lord Somerville, in a letter to Mr. Ellman, proposed the "cotting" of the South Down sheep. "Your South Downs must be cotted in the winter, or the wool will not work mellow enough for fine cloths; so the manufacturers say. Your sample of wool, I find, is superior to anything they have seen, or could believe. To you I look for the example of cotting all your wool next winter. In three years your staple would be more than one-fifth finer. The hard keep Ryeland sheep will bear, when cotted at an easy expense, cries out for universal imitation."—Memoir of Mr. Ellman—Baxter's Agricultural Library, p. 38.

† Memoir of Mr. Ellman—Baxter's Agricultural Library, p. 38.

black-faced sheep of Hampshire are a cross between the old black-faced Berkshire and the pure South Down. The modern Berkshire owes his best qualities to the same source; and the Wiltshire is become but a variety of the South Down. Crosses between the South Down and the Norfolk breeds are much valued in Norfolk, Suffolk, and Cambridge; and in Norfolk, as well as in Dorset, the South Downs are contending, and successfully, with the pure breeds of those counties on their own ground, and promising, at no very distant time, either quite to supersede them, or materially diminish their range. A contest that will be attended by a similar result is carrying on between them and the Cotswolds and the Ryelands, in some parts of Gloucester and Hereford.

They have reached, and they have established themselves, in Ireland. The first experiment was made in the county of Wicklow, under the direction of the Farming Society of Ireland, and they improved, and in process of time almost banished, the native breed. Thence they spread, in greater or less numbers, and where the locality suited, to almost every part of the sister island *.

The old sheep of the Weald of Sussex (a few of which are still found in many parts of it feeding on the commons in summer and the stubbles and ley grounds in winter) are small, ill-formed, slow to fatten, and with comparatively coarse wool. They betray, however, considerable affinity to the South Downs, and were probably the native sheep of the hills, either not improved, or degenerated in size, and form, and wool. The Weald farmers do not often keep many sheep of their own, but depend on the Down flocks to consume their winter food. The wool of the Weald sheep used to resemble that of the underhill South Downs, being longer, coarser, and yet softer, than that of the more upland sheep.

In Western Sussex, where the land is considered too good and wet to keep breeding flocks, a heavier sort of sheep is found, which seem to have been a cross of the Somersets and the Downs, and are purchased by the farmers in the autumn, at the fairs in the west of England.

In many parts of Sussex, the Somersets and Dorsets are much used for early lambs. Pampered on the richest keep, the period of œstrum is considerably hastened: the lambs are dropped in January, and sometimes in December, and are ready for the London market on or before Easter. The Down lambs also fatten kindly, and come to the market in June and July, being then much more delicate than the earlier horned lambs. The

* In 1829 Mr. Ellman retired from public life. His flock was sold by auction at the following prices:—his 770 ewes from one year old to old ewes, both inclusive, produced an average of 3*l.* 1*s.* 6*d.* each—320 lambs averaged 36*s.* each—his 36 rams averaged 25*l.* each—32 ram-lambs 10*l.* each—and 241 wether-lambs 21*s.* each—one ram sold for 65 guineas. Soon after his retirement a massive silver tureen was presented to him by 186 noblemen and gentlemen. It bore the following inscription:—

To
JOHN ELLMAN OF GLYNDE, ESQ.,
on his retiring from the farm
in which, for more than half a century, he had devoted himself
TO THE INTERESTS OF AGRICULTURE,
as a token of their sincere regard, and a tribute to his great merit,
especially in improving and extending throughout
THE BRITISH EMPIRE
THE BREED OF SOUTH DOWN SHEEP,
and his much-admired conduct
TO HIS LABOURERS,
this piece of Plate is presented
by a number of Agriculturists and Friends;
and to his Family
a Portrait of himself.

West-country breeders of Down sheep contrive by high feeding, and that constitutional disposition which habit gives, to occasion the ewe to flower in August or September; but the East-country farmers, who are flock-masters, prefer October and November for the impregnation.

Petworth and its neighbourhood provide a considerable number of grass lambs for the metropolis. The breed is the Dorset, and the favourite time of lambing a month before Christmas. The ewes are kept on the stubbles and leys to nearly the time of lambing, and then on turnips or tares, or any artificial herbage which the farmer may possess. The lambs are ready in April. If the farmer has a considerable quantity of food left, he immediately throws his ewes into a flush of keep, and puts them again with the ram; but if it has been all expended on the lambs, he sells his ewes Ewes impregnated at this early season are valuable to the house-lamb farmers, who either buy them of the field-lamb farmer, or of the middle-man.

It will now be convenient to take a rapid survey of the short-woolled sheep in other districts.

KENT.

Next to Sussex, the greatest number of South Down sheep are found in Kent. The northern and eastern districts have much open ground and short pasture, and these sheep are much prized there. Even on the extreme eastern part, and not far from the head-quarters of the long-woolled sheep, the South Downs are diligently cultivated. Mr. Henry Boys of Waldershare, and his father, expended very considerable sums in the hire of rams and the purchase of ewes from Mr. Ellman. Nearly 525,000 short-woolled sheep were kept in Kent in 1800; the number has, however, considerably diminished. The value of the long-woolled sheep, that have from time immemorial inhabited Romney Marsh and its environs, has been better understood, and they have gradually spread themselves far into Kent. In some parts of the east of the county a polled breed of middle size, a cross between the Romney Marsh and the South Down, is found—the faces mostly white, but some of them grey. They are a useful kind of sheep, and, kept on upland pasturage, yield a wool that can be appropriated to many useful purposes.

The midland part or the Weald of Kent is somewhat singularly farmed. There are few sheep during the summer months, but in the winter the fields are covered with stock of various kinds. Great numbers of Romney Marsh lambs are sent here in the winter season. The wethers that are grazed on these pastures used to be partly Wiltshire and partly South Downs, but the latter have now beaten the others out of the field. Many of the South Downs are bought in at Michaelmas while lambs, and fed on grass or hay, with occasional oil-cake or turnips.

SURREY.

The short-woolled sheep were the original inhabitants of this county, and still continue to retain almost exclusive possession of it. They may yet be seen, scarcely changed, on some of the wild and sterile heaths with which Surrey abounds. They were small, the head small, low, and yet light in the shoulders and fore-quarters; the back a little ridged, the loin moderate, and the quarter good; yielding but a scanty portion of wool, but the flesh of remarkably delicate flavour. The Bagshot sheep may be considered as an improved remnant of the old stock. The Banstead was a purer variety, celebrated for its short, thick, close fleece, and for mutton that could delight even a royal epicure. It is not, however, only in the story of by-gone

days that we "hear Sir Richard Sutton say how the king (Charles II.) loved Banstead mutton." Many a party goes from London to Banstead in the summer; and whether it is that rejoicing in their temporary escape from the smoke and turmoil of the city, and delighted with the beauty of the scenery around them, they relish the plainest fare, or that the meat of the small South Down, or heath-sheep nearly lost in the South Down, retains its wonted flavour, the leg of mutton, with its traditional and never-failing accompaniment, the cauliflower, is as delicious as it was in the days of the Merry Monarch.

The first recorded alteration of the Surrey sheep seems to have been the introduction of the large Wiltshire on the sheep-farms of the chalk hills; the old breed still occupying the extensive and barren heaths. This was probably contemporaneous with that of turnips and the artificial husbandry. The Wiltshires, in their turn, were rivalled, and in many places superseded by the South Downs. The South Downs were better suited to the soil than the larger Wiltshires; and in process of time, on account of the neighbourhood of this county to the metropolis, the Dorsets came in, to supply the London markets with early lambs. The Dorsets are never bred in Surrey. The aged, or dropt-horned Dorset and Somersetshire ewes are purchased in the autumn by the light-land farmers of nearly the whole of the county (chalk lands excepted), in order to rear early lambs for the London markets. They are sold in the spring to the graziers of Essex and other counties to be fattened, but there are no flocks of Dorset sheep permanently kept in any part of the county. Used in this way the Dorsets extend from Guildford, or the extremity of the Hog's Back, to Ewell, and from Shackleford, or Pepperharrow in the south, to Sheer in the east. The grass-lambs, as they were termed, did not obtain so high a price in the market as the house-lambs, but they gave less trouble in the rearing, and the management of them was not so expensive. They were generally ready for the butcher in April or May, and the ewes were fattened and sold in the following autumn.

Our friend, Mr. Baker, of Reigate, informs the author that the South Downs are the prevailing, and almost the only breed in the neighbourhood of that town, and in the whole of that part of the county; and that it is the black-faced and black-legged variety of this breed—a lighter colour considerably lessening the supposed value of the sheep here. If any cross is admitted, it is one with the West-country down sheep, which seem to suit, more than any others, this soil and pasture. These West-country down sheep are mostly from down ewes, which were sent into Somersetshire to their best rams, in order to obtain an increase of size, and their produce in due time returned. In the neighbourhood of Bletchingley the South Downs are the stock-sheep, but the Dorset and West-country down sheep are kept for lambing. After all, Surrey presents a motley collection of sheep—the native heath sheep, the Wiltshires, the South Downs, the Dorsets, the Mendips, the Berkshire, the Anglo-Merino, the Romney Marsh, and the Leicesters. The three latter are few in number, and scarcely taken into account in the computation of the produce of wool.

In 1800 there were supposed to be 283,000 short-woolled sheep in Surrey, yielding 3540 packs of wool. The average length of the fibre was 3 inches, or nearly the same as the underhill South Down. The calculated produce of wool in 1828 was 4127 packs, and the length of the fibre was 3½ inches; the number of sheep would, therefore, be nearly the same*. We now take a direction north-west to

* The author acknowledges much obligation to Mr. T. Drewitt, jun.

BERKSHIRE.

On entering Berkshire from Surrey, the traveller finds a light, and sandy, and barren soil, which, among other breeds, still maintains a small ill-formed sheep, with black face and legs, a light fleece of not more than a pound and a half in weight, but the wool being fine and soft, and the meat remarkably fine-flavoured. Extending westward on the borders of Hampshire there is much forest and unproductive ground, where the sheep are few, and not of good quality. Towards the centre of the county the old Berkshire breed used to be found. Most of them were horned, but some were polled: they had generally black faces, Roman noses, black or mottled legs, and long tails: some few, however, had white or mottled faces. They were strong, active, and tall, and folded well; and when fattened grew to an enormous size, but it generally took a long time to make them fat. Mr. Herbert says that "they were next in weight to the old Leicester breeds, but higher than them on the legs. The wethers, when moderately fat, weighed from 10 to 13 stones, and, when fattened for prize show, they averaged from 16 to 22 stones*." The wool, although somewhat coarse, ranked among the short varieties.

The first cross of this breed, and an improvement too, was—as in the greater part of this district—with the Wiltshires; but the produce of this experiment, although they folded almost as well as the old Berkshires, were too heavy for the general character of the soil, and difficult to fatten. The South Downs gradually spread here, and effected a complete revolution in the character of the sheep; and, with few exceptions, the Berkshire sheep are now either pure South Downs, or very deeply crossed by them. Some traces of the primitive sheep, but much improved by the South Downs, are found, mixed with Wiltshires, in the Vale of White-horse. In the Vale of Kennett there is a heavier sheep variously crossed; but the chalk-hills are in the full possession of the South Downs, except that there are at the foot of the hills, and in other parts of Berkshire, many Dorset sheep, and some crosses that do not answer quite so well, in order to supply the metropolitan market with early lamb.

The number of sheep kept in Berkshire has scarcely altered since 1800. Mr. Luccock computed them at 306,600, the weight of the fleece being 3¼ lbs., and the number of packs 4151. The average weight of the fleece is now 3½ lbs., and the number of packs 4471.

HAMPSHIRE.

In many of the open and uncultivated parts of this county, the same sheep is to be found which has been described as prevailing on similar localities in Surrey. The sheep that used to inhabit the more fruitful districts bore some resemblance to the Wiltshires that will next pass in review, but had a few essential points of difference. They were horned, tall, light and narrow in the carcase, and usually with white faces and legs. It can scarcely be said that they have improved; they have disappeared: although it would be difficult to trace the crossing which could produce the short-legged, round-barrelled animal that is now found, content with short pasture, and easily fattened. The Western and the South Down sheep hold this county between them. The villages of East and West Meon used to be said to form the boundary between these breeds, but this was perfectly imaginary. It would be no easy task to describe the precise distinction between them. The South Downs may probably be traced to some admixture of a midland breed with the native one of the southern

* British Farmer's Magazine, November, 1830, p. 438. The old stone of 8 lbs. is still retained in this work.

district. The West-country Downs derive their crossing, as their name would seem to import, from sheep farther west, and mostly, as has been already stated, from Somersetshire*. The Hampshire West-country sheep are probably a little larger and coarser than the South Downs, more woolly about the face, and not so black in the face and legs; they cannot be stocked so closely, some say almost in the proportion of three to two; but many of these distinctions are rapidly passing away. The sheep-farms are numerous throughout the county, particularly towards the north, on account of the excellent food for this kind of sheep which such a locality affords, and because the majority of the farms could not be cultivated without them.

The management of the sheep in the neighbourhood of Winchester, as described by Mr. Kirkpatrick, will afford a competent notion of the mode of sheep-farming in this county. The farmer does not consider the profit on early lambs as equivalent to the advantages afforded by keeping South Downs. He stocks very hard, and feeds his land as closely as possible, and this can only be done with South Downs. When the food is all eaten off, the farmer carries straw upon the ground, and pens the sheep at night upon it; which not only affords them a comfortable bed and protection from the rot, but being well trampled into the ground, mixed with the dung, forms a very valuable manure, which is carried on the ground at the least possible expense. As soon as this is well trodden in, the field is ploughed, and this mode of proceeding is thought to be a most effective mode of manuring and cleaning the ground. Some farmers, however, occupying considerable portions of land, still adhere to the old custom of rearing lambs for the early markets, and part with the whole of their stock every year. The Dorset ewe is occasionally used, but preference is given to the West-country Down ewe, crossed by the South Down ram.

Mr. Kennedy states that "the sheep-farms in Hampshire generally consist of one-third pasture land, and two-thirds arable. Their having winter or summer pasture depends on a variety of circumstances. If the sheep are put out to feed during the winter, the charge is from 5*s.* to 7*s.* per head for six months' keep. Sheep and wool form a very considerable proportion of the dependence of the farmer in this county, the latter being relied on for the payment of one-fourth or more of the rent. The average prices for the last ten years have been, for ewes, 28*s.*; for two-tooth wedders, 24*s.*; for lambs, 18*s.*; and for wool, nearly 1*s.* 2*d.* per lb.†"

Some flocks of the pure Merinos are still kept in Hampshire. The chief and insuperable objections to them have been already stated. A cross between the Merino ewe and the South Down ram has been tried, and has its advocates. It will probably supersede the pure Merinos.

In Hampshire, exclusive of the Isle of Wight, 516,600 sheep used to be kept, yielding a fleece of 3 lbs. each, and amounting to 6457. The number of sheep had somewhat increased, but the rot has been so peculiarly destructive in this and the neighbouring county, Surrey, that it is doubtful whether so many sheep are now bred. The nature of the soil, and the character of the farms, in a great part of Hampshire have also prevented

* Mr. Herbert, who is no mean authority, assigns a different pedigree to the Hampshire South Downs. He says, that "the black-faced sheep husbanded in Hampshire are for the most part a cross between the old black-faced Berkshire and the pure South Down breeds, as are most of those fattened in the west of Sussex." It has been said, but without proper authority, that Mr. Ellman's South Downs are a cross of the Berkshires with the native Down sheep. The country owes much to Mr. Ellman, but it is probable that the principle which chiefly guided him was "selection from the native breed."

† The Present State of the Tenancy, p. 132.

the fleece from becoming heavier, so that the twenty-eight years which elapsed between the surveys of Messrs. Luccock and Hubbard produced very little change either in the character or the number of the sheep.

ISLE OF WIGHT.

The author is indebted to Mr. R. G. Kirkpatrick, of Fairlee, for some valuable information as to the character and management of sheep in this island. The Isle of Wight cannot be said to have any breed of its own; but it is the general custom in autumn to purchase ewes forward in lamb, either at Weyhill, or some other fair in the west, and this for the purpose of rearing early lambs. They are chiefly Dorsets or Somersets crossed with the South Down ram. The South Down ewe will not so well answer the purpose of the farmer; for although the lamb, in order to sell well in the London market, must be polled, yet the South Down ewe is so much later in season than the Dorset, that it is impossible to obtain early lambs from them. A cross between the Dorset or Somerset ewe and the South Down ram produces the lamb which is best suited for the London market. It partakes much more of the appearance and nature of the ram than of the ewe, being almost uniformly hornless, and having a black muzzle and legs, and short wool, and therefore passing in the market as an early South Down, the flesh of which is more highly esteemed by the epicure than that of the pure Dorset, or of the Somerset. The profit depends on the price of lamb in the London market, and that is regulated by the earliness of the period at which it is brought.

Some Isle of Wight farmers, however, dispute the propriety of this practice. They state that, owing to the hardy nature of the South Down sheep, three of them can be kept in thriving condition, on food that would scarcely support two Dorsets, or Somersets. It is likewise observed that if the latter sheep are turned into a field with scanty fare they are apt to stray, while the South Down quietly begins to make the best of what he can get. Allowing the truth of this, the majority of the island farmers adhere to the West-country sheep. It is a larger animal, and yields more wool, and produces its lamb earlier. This last circumstance is decisive, for early lambs best suit the system pursued by the Isle-of-Wight farmer. His hay and turnips enable him to fatten off early lambs; but were the lambs to fall late, the turnips would be spoiled before they could be consumed, and he has no water meadows, or grass crops on which he could fatten the lamb that falls a few weeks later.

There are, nevertheless, several flocks of pure South Downs kept on the Isle of Wight. The ridge of hills which runs across the island from east to west, and widens so considerably towards the south and west, presents a locality and a pasture very little different from their native Sussex hills; and the Isle of Wight sheep are not inferior to the majority of the parent flock. An old clothier, speaking of the wool, says, that "the down wool is rather finer than the Wiltshire,"—this is the character of the Sussex South Down—but "inclosures and large farms have gradually introduced a larger sort of sheep,"—the Somersets and Dorsets, that have been referred to—"coarser and deeper in the staple, and in the same sort, or greater proportion, lessen the quantity of short or clothing wool*."

According to Mr. Luccock, the number of sheep kept in the island was about 52,000, and 8000 lambs; the weight of each fleece 3¼ lbs., and the number of packs 800. The altered character of the sheep has now raised

* Agricultural Magazine, March, 1803.

the fleece to 4 lbs., and the number of packs to 1016, consequently the number of sheep has somewhat increased.

WILTSHIRE.

The manner in which Mr. Luccock introduces his account of the Wiltshire sheep exhibits some quiet but genuine eloquence. "Nature, and the modes of husbandry adopted in Wiltshire, divide the county into two parts. The south-eastern division is distinguished by an amazing extent of high and chalky land, where open downs succeed to each other, and to the tired eye of the stranger appear cold, and dreary, and comfortless. Yet here the reflecting traveller will notice the features and the soil of the country, and the immense swells of chalky earth, which seem the general deposit of that substance; and he will observe that, though ill adapted for the habitation of man, the wilds are every where traversed by numerous flocks of sheep, evincing that the driest wastes may be rendered productive by human industry. He will likewise observe how well the animals that graze on it, in their structure and their habitudes, are suited to the soil. The farms required an animal light and active, able to pass without injury over a large space in a little time, to climb without difficulty the most abrupt steeps of a billowy district—to endure the heat of the summer sun without a shelter, and to subsist upon the herbage which it could crop from the driest downs. As the fold is the chief object for which flocks in this district are kept, they must travel far at morning and evening to their pasture and their lodgment. For circumstances like these, every one who observes the Wiltshire breed of sheep will find it adapted in its structure, disposition, and lightness of fleece*."

These Down sheep shall first pass in review, exceedingly different in their former and present state and character; yet in both illustrating the description which Mr. Luccock gives of them. The sheep that used to be kept on the Downs were the Wiltshire horned ones, with large head and eyes, Roman-nosed, long-faced, wide nostrils, horns falling back behind the ears, chest tolerably wide and deep, back straight, legs somewhat awkwardly long, and the bones too large. The wool was at that time much prized: it was of a medium length and fine, and the fleece weighed from 2 to 2½ lbs. The ewe had not any wool beneath the belly.

These sheep were rather greedy feeders and somewhat slow in fattening, but when fattened they occasionally attained very great weight. Mr. Herbert says "that in the week immediately preceding the Christmas of 1788, he saw hanging in a butcher's shop, in London, three Wiltshire crocks (crooked)—so called from the shape of the horn, turning back behind the ear, and bending over the cheeks—the bare carcases of which averaged 33 stone 1 lb. each. The weight of these wethers, when but moderately fattened, used to be from 14 to 18 stones each. The Wiltshires were the largest breed of fine-woolled sheep †."

The history of one of the Wiltshire lambs is also handed down to us. "It was a twin lamb, and being bred by a ewe that was thought incapable of fattening two, and being inferior in size to the other, it was early taken from its dam, in order to be brought up by hand. Its food was cows' milk and oats, and it was rather more than half-a-year old when killed. Its carcase, which for fatness and delicacy of colour was pronounced to be one of the best ever sold in Smithfield, weighed more than 24 lbs. per quarter, besides 14 lbs. of loose fat ‡."

* Luccock on Sheep, p. 273.
† British Farmer's Magazine, Nov. 1830, p. 438. Lawrence on Cattle, p. 402.
‡ Commerc. and Agricul. Mag., April, 1800.

These sheep not only prevailed on the Wiltshire Downs, and were much and deservedly valued there, but were found in considerable numbers in North Devon, Somersetshire, Buckinghamshire, and Berkshire. They were a peculiar breed, differing in the shape of the horn, and in other points, from the sheep of any other part of the kingdom, and were probably indigenous to the Wiltshire Downs. If they were rather slow in feeding, they were excellent folding sheep, and enabled more corn to be grown in Wiltshire, in proportion to its size, than in any other county in England. The genuine South Downs were then little known, or could scarcely be said to have existence; and the wool of the Wiltshire sheep was highly prized. It was that from which the *second*, or super-broad cloth was chiefly made *.

On account of the comparatively slow fattening of the sheep, and the scantiness of the pasture, some ingenious contrivances were resorted to, in order to promote the condition of the flock. If it were possible, they were turned on better grass a little while before they were folded, and had leisure to chew the cud, and to digest their food during the hours of rest; and in the morning, their stomachs being emptied, they were not only able, but eager to climb the hills to their daily pasture †.

The Wiltshire sheep-grower, as may be supposed, was always ready to get rid of his young stock; and a great part of the wether lambs were disposed of soon after midsummer: others were kept until the succeeding year, and this, perhaps, was the most profitable way of managing them. In fact, the Wiltshire men were solicitous only to keep a good stock of breeding ewes, and the lambs were destined to arrive at maturity in other counties. The graziers farther northward came into Hampshire and Wiltshire for the stock with which the London market was afterwards supplied.

These Wiltshires have now passed quite away. They were, to a certain degree, improved by selection of the smaller, the better formed, and the more kindly feeders among the native breed; but most of all were they indebted to the South Downs, by whom they were crossed again and again, until almost every trace of the old Wiltshire breed had vanished, and a useful variety of the South Down remained—only distinguishable from the true Sussex sheep by somewhat larger size, and lighter colour, and a lighter and finer fleece. The advantage of the change will be sufficiently evident from one authenticated fact related by Dr. Parry. "A Mr. Dike had a farm of 230 acres of arable ground. Until 1791, the flock consisted of from 320 to 360 breeding ewes, which produced 300 lambs annually. After 1791, 430 South Down ewes were substituted. These brought 430 lambs, and yielded in all an annual profit of 304*l.* 10*s.* more than had been obtained from the Wiltshire flock ‡."

* Agricultural Mag., October, 1801.

† Marshall's Southern Counties, vol. i.

‡ Agricul. Mag., Aug. 1806.

A somewhat cruel, but necessary experiment, was made about this time in order to ascertain what breed of sheep would best bear hard feeding. The Duke of Bedford ordered seven each of South Downs, Cotswolds, and Wiltshires to be turned into a bare pasture, in November 30, 1793, and to be kept there during the winter. Hay was given to them only when snow was on the ground, and then in small quantities. At the end of the winter they were weighed: the Wiltshires had lost 120 lbs., the Cotswolds 98 lbs., and the South Downs only 49 lbs. On the following November, the same sheep were put to turnips, and remained until the 7th of April; hay being given in small quantities. The Cotswolds gained 11 lbs., the Wiltshires 37, and the South Downs 38. This experiment was far from satisfactory, for no account was taken of the quantity of food consumed by each. The weather was exceedingly bad during the whole of the time, which accounts for the little improvement made by any of them.

A third experiment was more to be depended upon, viz.:—the proportion between the live and dead weight of each. One of each was fairly selected, and killed on the 8th of

When the present Wiltshire South Downs were thus formed and established, the average weight of the fleece was not at first more than 2¼ lbs.; but that artificial system of husbandry which gradually increased the weight of the carcase, added also to that of the wool, which is now usually at least 2¾ lbs.—some farmers say from 2½ to 4 lbs. That additional weight was in some degree accounted for by the closer coat which the improved animal wore; but more so by the increased size of the fibre. Perhaps the fleece of the Wiltshire sheep has changed as little as that of any breed, or even less than any: but it has changed with all the rest. The evidence of Mr. Cunnington before the Committee of the House of Lords, in 1828, is decisive on this point:—"In 1815, a portion of Wiltshire wool, of the gross weight of 1060 lbs., yielded 60 lbs. of the best quality. In 1827, the wool on the same farm did not yield any of that quality. Of the second quality, in 1815, it yielded 498 lbs.; in 1827, there were but 287 lbs.; but there was a great accumulation of the middle sorts, unfit for making broadcloths. The greater part was then sold in Frome market, but it is now sent to the north, and principally used for flannels, and baizes, and goods of that description." This change will doubtless proceed, and it is the interest of the farmer that it should do so. He is getting as much as he used to do by his wool, and considerably more than he used to do by the carcase.

The number of sheep on the Wiltshire Downs is nearly the same as in 1800, namely, about 583,500, and yielding 6684 packs of wool.

A delineation is here given of a fair sample of the present Wiltshire wool.



1. 2.

1. *Its appearance, when viewed as a transparent object.*
2. *Ditto, as an opaque object.*

The fibre is one-five-hundredth part of an inch in diameter, and the serrations are 1860 in the space of an inch: they are well defined, but not hooked.

The cups in No. 2 are not well defined—they have more the appearance of serrations than of distinct cups.

This developement of the fibre perfectly agrees with the felting and the

April. The Wiltshire weighed 22 st. 4 lbs. live weight, and 10 st. 4 lbs. dead,—being in the proportion of 20 to 11⅔; the Coltswold, 20 st. 5 lbs. live, and 12 st. 2 lbs. dead,—being also in the proportion of 20 to 11⅔; and the South Down was 17 st. live, and 10 st. 3 lbs. dead weight,—being in the proportion of 20 to 12. The little difference as to their *proof* is singular; but, after all, it is to be recollected that these experiments refer to two breeds of sheep,—the Wiltshires, that are extinct; and the Cheviots, that were then mere shadows of what they now are. They are satisfactory, however, as to the excellence of the South Down breeds.—Annals of Agriculture, vol. xxiii., p. 275.

uses of the wool. It is softer, because it is finer than the picklock South Down, but its felting properties are not so great, and it is therefore used for somewhat inferior purposes. The price of the Wiltshire wool has certainly advanced within the last few years, and now seems to be steady at from 1*s.* 4*d.* to 1*s.* 6*d.* per lb.

Mr. Carr of Standerwick has kindly communicated the following account of the South Downs in the neighbourhood of Warminster. "They were first brought particularly into notice by Mr. Rickwood of Longbridge Deverill. They are active in searching for food, but otherwise of a quiet nature, and bearing the fold well. About 15 years ago they were attempted to be crossed by the Hampshire sheep, but the experiment did not succeed, and is now abandoned; the size was somewhat increased, but the propensity to fatten was considerably diminished. There is some defect of form in the fore-quarter, and particularly behind the shoulder. The average weight of the ewe is from 14 lbs. to 18 lbs. per quarter, and that of the wether from 16 to 20 lbs.; but they have been fattened to 40 lbs. per quarter. A four-tooth wether will usually eat 15 lbs. of turnips, or 20 lbs. of vetches, per day. The working stock have the down feed, with occasionally a portion of the second year's ley; and in the autumn some turnips. In the winter they depend chiefly on hay, unless understocked, there seldom being much grass left at that season of the year. The wool varies from 2½ to 3 lbs. on the ewe, and reaches to 4 or 4½ on the wether. The chalk and chalky loams produce the softest wool, and the red flinty loams the harshest: both are generally sent into Yorkshire and Glamorganshire." According to this gentleman, if there is any difference in the wool, it consists in its being finer than it was ten years ago. The ewes seldom produce more than one lamb at each birth, and the general deficiency of lambs, including barren ewes, &c., is about 15 per cent. The lambs are tailed in April, and castrated in May, the iron being used for both purposes: the operators are persons who make it their profession; and so skilful are some of them, that, out of 4000 lambs, Mr. Carr lost only three. The value of the ewe, taking an average of ten years, is about 24*s.*, and that of a lamb 15*s.* or 16*s.*, the wool being from 1*s.* to 1*s.* 1*d.* per lb.; and, on the whole, sheep-farming is the sheet-anchor of South-west Wiltshire husbandry.

Mr. Benett, M.P. for Wiltshire, still continues a zealous breeder and advocate of the Merinos, and there are some flocks of these sheep and of crosses from them in various parts of the county. The soil and the climate seemed to agree better with them here than in any other district in the kingdom, and they also here found a breed of sheep, which they could more rapidly improve, and with which they could more perfectly amalgamate than in any other district. Mr. Bartley gives an interesting account of this:—"I had twelve ewes shorn, the fleeces weighing 6½ lbs. per fleece. These sheep descended from Wiltshire ewes carrying fleeces of about 3½ lbs. only; but, by repeated crossings—the first and second by his Majesty's ram—they now approach very nearly to the entire Spanish blood, evinced also by the following circumstances:—like ewes of the Spanish breed they are hornless, whereas Wiltshire ewes as well as rams are well known to be horned sheep. The fleeces are close, compact, equal in weight with the Spanish, and acknowledged by competent judges to be equal in goodness too *."

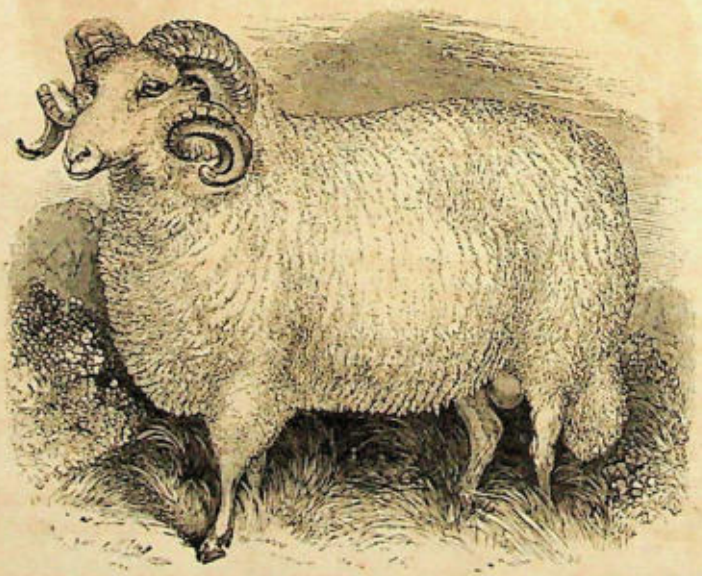
It is to be hoped that the Merino breed will continue to be preserved by Mr. Benett and other zealous agriculturists; for the change which

* Agricultural Magazine, April, 1803.

has taken place in the general character of the British short wool, and its conversion from a carding to a combing material, render it far more likely than in former times that one, or an occasional, cross with the Merino may be of essential service. That fineness and softness, as well as length of fibre, may be communicated, which would materially add to the value of the fleece.

Of the short-woolled sheep of the low-land pastures of Wiltshire it will not be requisite to say much. The South Downs there also prevail, but they are of a larger size and heavier fleece. They are mixed with some Dorsets and Somersets for the sake of early lambs. The water-meadows also afford abundant, but, occasionally, dangerous food for the sheep and lambs. In April the grass is deep and rank upon them; this is folded off by the sheep and lambs as close and naked as possible: the water is then turned over them again, and, in the course of six or eight weeks, they produce two tons of hay per acre. The water-meadows can only be fed upon with safety in this early period of the spring. The number of sheep kept on the pasture-country is still, as it was in 1800, about 117,500; but they have increased in carcase far more than the hill-sheep, and the number of packs of wool is now 1958, instead of 1460 *.

DORSETSHIRE.

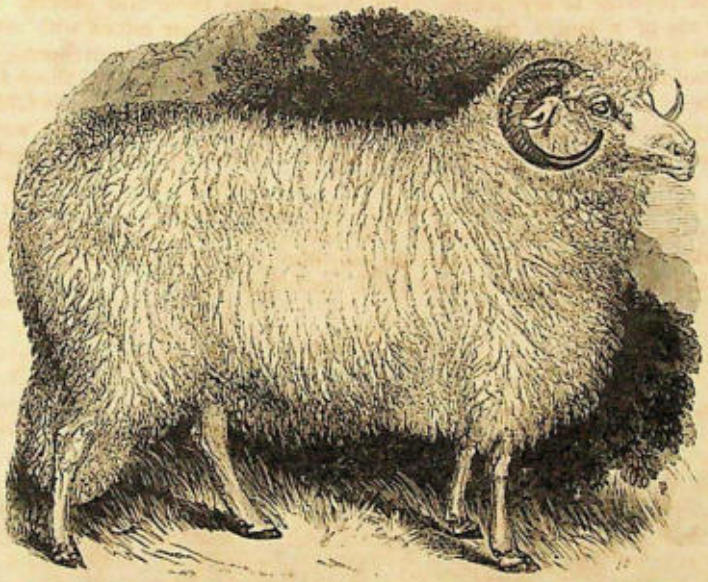


Dorset Ram

This county possesses a valuable breed of sheep, peculiar to itself, yet bearing some not indistinct resemblance to those on the still more distant coast of Devon. They are chiefly collected within a circle extending ten or

* The system of commonage which once prevailed in this part of Wiltshire is now nearly abolished. The common sheep down was open for the common flock during summer and winter, and the unsown field or the summer field until it was ploughed for wheat. The sheep had then only the down, until the harvest was over, and the other fields clear. After that, they had these fields and the downs, until the weather obliged

twelve miles from Dorchester. Most of them, at least of the pure breed, are entirely white, the face is long and broad, and there is a tuft of wool on the forehead; the shoulders are low but broad, the back straight, the chest deep, the loins broad, the legs rather beyond a moderate length, and the bone small. They are, as their form would indicate, a hardy and useful breed; they are good folding sheep, and the mutton is well flavoured: they average, when three years old, from 16 to 20 lbs. a quarter.



Dorset Ewe.

Their principal distinction and value is the forwardness of the ewes, who take the ram at a much earlier period of the year than any other species, and thus supply the market with lamb at the time when it fetches the highest price. They were said to bear lambs twice in the year; and there are occasional instances of this, although the period between the dropping of one lamb and the conception of the second can only be five weeks. When kept on luxuriant food, they will often admit the male ten or twelve days after yeaning, and continue to suckle the first lamb after they are pregnant with a second.

Their real value, however, consists in the early period of the year when they may become impregnated. This, with proper management, and

the owners to give them hay, and then were folded in the arable fields in a common fold; but when hay began to be given, every man found his own fold and his own hay,—the common shepherd feeding and penning the whole. When the ewes were near yeaning, the owners took them home to the inclosed meadows, and by the time that they had yeaned the water-meadows were ready for them. These were, in some cases, common for the sheep-stock; at other times they were private property. While the sheep were feeding on the water-meadows, they were usually penned on the barley-land, and by the time that the water-grass was eaten, the other was fit for the plough.

In this state of commonage there was necessarily a great scarcity of winter food; and therefore it was usual to sell off the old ewes and the wether lambs about Michaelmas, and to put out the ewe lambs to winter either on the pasture-land or turnips in other parts of the county, or frequently in the adjacent county.—Davis's Survey of Wiltshire, p. 17.

sufficient and luxuriant food, will take place as soon as April, so that the lamb will drop in September. About the end of August, or the beginning of December, these ewes are sold at the fairs in the neighbourhood of, or on the road to London, and the early lambs are brought up as *house-lambs*, to be ready for the market at Christmas.

By many farmers the practice of house-suckling the lambs is managed on a large scale. By all of them, however, a building is usually set apart for this purpose, divided into a certain number of coops for the division of the lambs according to their ages. Every evening the ewes are turned into the respective divisions of the lamb-house, and each mother speedily recognizes her offspring. They remain together until the following morning, when they are separated, and the ewes driven back to the pasture.

About a couple of hours after this the ewes that have lost their lambs, or whose lambs have been sold, are driven in, and held until their udders are perfectly emptied by the lambs, when they are returned to their separate inclosure. At twelve o'clock, the natural mothers are again brought, and they remain about an hour or two. At four o'clock, the foster-mothers are compelled to pay another visit of an hour's length; and at eight o'clock, the mothers return for the night. The greatest attention is paid to the cleanliness of the place, and the lambs are supplied with good wheat straw for them to nibble, and pieces of chalk to lick.

The ewes are kept in a near and well-sheltered pasture during the day, and are plentifully supplied with green rouen hay, grains, turnips, rye, tares, clover, or whatever the farmer may have to give them; and he occasionally varies the food, so that they may be kept in the highest condition, and with a full flush of milk. If their milk should fail, even but a little while, the farmer knows full well that the lamb is lost to the market, for no system of forcing can afterwards bring him again to the requisite state of condition.

At about eight weeks old, the lambs are generally fit for the market, and they will then sell at a high price; but, after December, the price very rapidly diminishes.

The lambs which are dropped late in December, or the beginning of January, are put with the mothers on dry, warm, inclosed pastures, and the ewes are supplied with turnips and sweet hay, so that they may have a plentiful flow of milk: they are also from time to time carefully examined in order that it may be certain that there is no deficiency of milk. The process of grass-feeding, however, has already been described.

The wool of the Dorset sheep is certainly inferior to that of the South Down. It is of an intermediate quality between the short Down and the Devon, and is chiefly used in the making of second, or livery cloths, of which there is a manufactory at Ilminster.

There are few counties which, taken throughout, bear so many sheep on a given number of acres, for the number is calculated at more than 632,000, and computing the weight of each fleece at 3¾ lbs., which has been about the average for many years, the quantity of wool grown will be 9900 or 10,000 packs. On the proper sheep farms, the stock, including the lambs, is more than two sheep per acre. These, however, are not all Dorset sheep. The pure breed seems to be concentrated around Dorchester, and even there some South Downs are found, either pure or crossing the Dorset. The breed between the Dorset and the South Down is a very useful one. It grazes well, grows to a considerable size, and produces a fleece weighing from 3½ to 4 lbs., and somewhat finer than the pure Dorset. This breed has rapidly increased within the last five or six years, and threatens to supersede both the Dorset and the South Down. Attempts have been made to cross

the Dorsets, and especially this improved breed of the Dorsets, with the Devonshire notts; but these experiments have not succeeded, the carcase has not been much improved, and the wool has been rendered long, coarse, and yet light, and therefore unprofitable. Crosses have also been attempted with the Leicester, but these also have failed.

Having proceeded eight or ten miles from Dorchester, the Dorsets in a manner disappear, and the country is occupied by the South Downs. There has been a long struggle, and with variable success between these breeds. The author's friend Mr. Spooner, now of Southampton, says that some years ago, when wool was the grand desideratum, the South Down breed was rapidly increasing, and was the most profitable; but that latterly, since the wool has been almost a secondary object, the Dorsets have been more cultivated for the qualities that have been just described. Still regarding the whole of the county, the South Downs constitute the most numerous breed; they are shorter feeders, and live on scantier keep than the Dorsets. The Dorset mutton is largest, but grown at greater expense, and never equals the South Down in flavour.

In the Isle of Portland, and formerly extending more than they do now into the neighbourhood of Weymouth, and about Wareham and Poole, there is a very small breed of sheep. They are horned, short in the carcase, and many of them black-muzzled, and having black and white wool intermixed on the lower part of the leg. When fat, they do not weigh more than 8 or 10 lbs. per quarter, and the fleece varies from $1\frac{1}{2}$ to 2 lbs. The flesh is delicate, and somewhat sought after; but the breed is little cultivated, except in the localities which Nature has assigned to it.

DEVONSHIRE.

In the counties which have passed under review, the short-woolled sheep have formed almost the exclusive stock. Some flocks of the Leicesters have probably found their way to a few localities that afforded sufficiently rich pasturage for them, but they have not been established in sufficient numbers to alter the general character and wool of the district. In the tract now to be reviewed, the case is very different; the long-woolled sheep will be found contending with the short-wools, in almost every district; and in the majority of the counties out-numbering and superseding them. The short-woolled sheep, however, will at present be alone considered.

The short, or rather middle-woolled sheep of Devonshire, a few of which are still seen in the southern part of the county, and ranging over the greater part of the hills in all the northern districts, but most numerous on the forests of Dartmoor and Exmoor, are everywhere of nearly the same character, and betray, on a smaller scale, a great affinity with the Dorsets. They have white faces and legs, generally horned, but some without horns. They are small in the head and neck, and small in the bone every where, the carcase is narrow and flat-sided, and they weigh, when fat, from 9 to 12 lbs. per quarter. The fleece is 3 or 4 lbs. in weight in the yolk, and the wool is short, but with a coarse and hairy top*. Great numbers of them, but not so many as formerly, are kept on the hills, and on the commons which, in this part of the country, are almost all covered with heath; but

* From a very early period, the Devonshire wool has borne the character of being of an inferior quality. It was stated (p. 213) to have been so, when the Devonshire manufacturers petitioned Edward IV. to permit them to mingle flocks with their wool, in the making of their serge cloths, because the wool was so gross and stubborn, that cloth could not be made thereof, without mixing it with flocks. The Leicesters are working wonders with the Devonshire aboriginal sheep, but a considerable length of time must yet pass before the greater part of the sheep will yield a wool worthy of this beautiful county.

the ewes are taken into the inclosures to lamb. The wethers remain on the downs for the sake of their wool, until they are five or six, or even eight or ten years old, except that in very severe winters they are taken into the inclosures in order to prevent their being buried in the snow. From their natural hardiness, however, they are not easily injured by cold or wet, or short keep. The mutton is delicate, and finds a ready sale in the metropolitan market; and the flesh of the old wethers, when it has been hung a sufficient length of time, has considerable resemblance to venison*. The diminutive horned sheep kept in the neighbourhood of Okehampton, and from which the Dartmoor mutton that supplies the distant markets is chiefly obtained, are small Dorsets, or at least very much resemble the smaller Dorset breed. They are fed on the low grounds, and kept until they are four years old. An improved system has, however, been lately introduced with regard to the lambs: the horned ewe is crossed with the Leicester ram; and from this cross the lambs often become as large in July as the native stock used to be when they had arrived at maturity. They retain much of their original wild character, and it is no unusual thing for some of them, when sent to a distant part of the country, to travel back forty or fifty miles in order to rejoin their companions in the forest.

Mr. Read, veterinary surgeon, of Crediton, says that the Exmoor sheep grow larger and have a better fleece when they are put on better pasture; but they are often very troublesome from their disposition to break their fences. He adds, that one cross with the Leicester ram increases the weight, does not diminish the flavour of the meat, and materially improves the fleece.

A small quantity of house-lamb is fed in Devonshire. These hill-sheep retain something of the disposition for early impregnation for which their former relatives the Dorsets are distinguished. The lambing begins about Christmas, and the lambs become ready for the market in May. Kept grass, and which in this district is often excellent, is chiefly depended upon as the food of the suckling ewe; although turnips are sometimes given, with a small portion of hay to prevent their injuring the ewes.

The South Downs never succeeded well on the heath-clad hills of the Dartmoor sheep. Neither the soil nor the herbage was congenial. Mr. Carpenter, to whom the work on "Cattle" was indebted for many valuable hints, tells a little story in illustration of this. Judge Buller (a name that will not be soon forgotten in Devonshire, the terror of the guilty, but the hope of the innocent) purchased a tract of land on Dartmoor. With all its wildness it had charms for him, for it was the scene of his early days. He built himself a house there, and raised various wall fences, and endeavoured to improve the land so far as it was capable of cultivation: and he stocked it with the hardy, coarse Devonshire steer, and the wild Dartmoor sheep; and they did well, and the speculation was as profitable as it could be on such a soil and in such a climate.

He died, and the premises were taken by a young farmer, and not a bad one, from the Ilminster district of Somersetshire. He commenced at Lady-Day, and as the spring advanced he increased his stock of beasts, and purchased 400 South Down sheep. All appeared to be going on well during

* Mr. Skeavington of Devonport, to whom a proof of this part of the work on Sheep was sent, previous to its finally passing the press, bears a little hardly on the Exmoor sheep. He says, "of all the ugly ill-shaped animals, the original Devon is the worst. It is a very hardy sheep, but light, and thin, and skinny. The meat has not that delicate taste you have given to it. It is perfectly tasteless and insipid, and for this plain reason—that the pastures are so bad, and there is so little depth of soil, that it is impossible to obtain a good herbage."

the summer, but in process of time a true Dartmoor winter set in. "I happened to call upon him," said Mr. Carpenter, "in the month of January, and on looking into his hay-loft, I saw an unusual number of sheep-skins, which had belonged, he told me, to animals that had lately died, and he feared he should lose every one of them. At all events, they were disposed of in quick time by the butcher or by disease; and he tried no more South Down sheep, but returned to the ugly old Dartmoors. In fact he wished himself at home in Somersetshire, paying 4*l.* per acre rent, rather than occupying his new farm at Dartmoor, at 10*s.*

Our friend Mr. Skeavington tells us, that on the more cultivated parts, even in the immediate neighbourhood of Dartmoor, the South Down sheep have been introduced with evident advantage; and he thinks that if the farmers could be induced so far to deviate from the usage of their forefathers as to adopt the system of folding, the South Down sheep would be still more valuable, from their capability of travelling to and from the fold. The lime bill, which on some farms amounts to a very considerable sum, would be reduced, while there would be a manifest increase of the crop from the change of manure; for he says, and with great propriety, that "a change of manure is as necessary and beneficial to the land as a change of crops." Mr. Wreyford, of Clanaborough, is also partial to the South Down sheep. He thinks that he can keep double the number of the South Downs on the same ground that he can of the Devonshire sheep.

The Devonshire notts, or polled sheep used, forty or fifty years ago, to be at least middle-woolled, if not short-woolled sheep; they were probably derived from the Western Downs, and had evidently many of the Down properties about them, but they have now been crossed by the Leicesters; their wool has been lengthened, and at the same time rendered finer, and, under the name of the Bamptons, they rank among the long-wools, and they are not inferior to any breed in early maturity, in weight, and in wool. The South Ham sheep were originally long-woolled.

The Buckland breed, so called from the village in the neighbourhood of which it used to be most numerous, was once considerably celebrated. It was derived from the Old Hill sheep, but had much degenerated. Some zealous breeders effected its renovation towards the close of the last century, and the comparative fineness of the wool and the good grazing qualities of the breed were recalled by referring once more to the parent stock.

Very few South Downs are found in any part of Devonshire: they have been tried, but they do not appear to be suited to the soil and produce of this county. There are hills enough, and open and bleak enough, but they are covered with coarse heath, instead of short fine grass, and they have too much wet and poachy ground about them.

The wool produced in Devonshire used to be manufactured in the same county, not indeed in large factories, but at home and by the family of the principal workman. This old method of working the wool, never very profitable, or consistent with the commercial superiority of England, is now laid aside; but it lingered longest in this south-western portion of the kingdom.

In very few counties in England has so complete an alteration taken place in the character and produce of the sheep as in Devonshire. When Mr. Luccock compiled his table in 1800, he stated the number of short-woolled sheep to be 436,850, and that of the long-woolled sheep 193,750. The number of packs of short wool were 7280, and of long wool 6458 packs. The number of packs of short wool has now diminished to 2275, but no satisfactory account has been obtained of the increase of the long wool. The fleece of the Dartmoor sheep, as well as the carcase, has been essentially

altered by a cross with the Leicesters; the wether at three years old will now average 24 lbs. the quarter, and the fleece will weigh 6½ lbs. with the yolk. The fleece has also materially improved in fineness and softness of fibre, and is more useful for many important purposes*.

CORNWALL.

Borlase, in his Natural History of Cornwall, says, that "the sheep of Cornwall in early times were remarkably small, and their fleeces so coarse, that their wool bore no better title than that of Cornish hair; and, under that name, the cloth made of Cornish wool was allowed to be exported without being subject to the customary duty paid for woollen cloth. When cultivation began to increase, and the cattle to improve in size and goodness, the Cornish had the same privilege conferred on them by grant from Edward the Black Prince, the first Duke of Cornwall, on condition of their paying 4*s.* for every hundred weight†."

Anderson, among the valuable records of the olden time which he has preserved, gives the comparative price and value of the Cornish wool, at the first identical period, A.D. 1343, when the Black Prince was twelve years of age. The Shropshire wool sold at 14 marks, or 9*l.* 6*s.* 8*d.* per sack; the Oxford and Staffordshire at 13 marks; the Leicester, Gloucester, and Hereford, at 12 marks, or 8*l.*; and the Cornish wool at 4 marks only, or 2*l.* 13*s.* 4*d.* per sack. In 1602, Carew says of the sheep that they have little bodies, and coarse fleeces, and are comparatively of little value. The native sheep of the present day, which, with all their defects, are a great improvement on the old ones, much resemble their neighbours on Dartmoor and Exmoor. Some have horns and others are polled; their heads are large, and of various colours, some nearly white, others black, and another class of them dun-coloured. They have long necks, flat sides, short quarters dropping considerably at the rump, the legs rather long, the wool short, thick, and fine, and the sheep altogether having a light, pleasing, agile appearance. The average weight is about 14 lbs. per quarter, and the flesh possesses a fine flavour, and is much esteemed: they have much, and too much inside fat, and the proportion of the offal is almost one-half.

These sheep are chiefly found on the downs and heaths, in every part of the county, and on the sandy hills scarcely covered with the green sod, in the neighbourhood of the Land's End. In this latter situation they are much prized on account of the peculiar flavour of the mutton, arising from the nature of the herbage on these hillocks of sand, and the variety of aromatic plants that abound, and not, as Borlase tells his readers, from "a multitude of snails of different species, and of all sizes, which are crawling over the herbage, and eaten by the sheep." The sheep of this locality have the fleece considerably finer than in other situations, and resembling the South Down wool. The native breed is considered to have reached its maturity at four years old. The average number of twin lambs produced is about one in six. The lambs are generally well covered, and there is no great difficulty or danger in yeaning. The lambs run by the ewes' side until May, when they are weaned and put on the best new grass; they are afterwards sold to be fattened on gentlemen's estates, or for the use of their families, or purchased by the graziers who prepare them for the neighbouring markets‡.

* For much of what is valuable in this account of the Devonshire sheep, the author is indebted to the kindness of Mr. George Turner of Barton, Alphington.

† Borlase's Natural History of Cornwall, p. 286.

‡ For the greater part of this history of the native Cornish short-woolled sheep, the author is indebted to Mr. Karkeek, a truly scientific veterinary practitioner at Truro; and also to Mr. George Bullmore, of Tregean, Newlyn.

Various experiments have been made to improve this breed of sheep. The South Downs have had full and fair trial, and, compared at least with their success elsewhere, they have failed either to establish themselves or to make any considerable advantageous change in the character of the native breed. The varying and humid climate of Cornwall was even more unfriendly to them than that of the west of Devon. The Leicester sheep, however, have been profitably employed. They have introduced a new breed, possessing all the hardiness of the old stock, and the improved fleece and disposition to fatten of the Dishley race. The consideration of this, however, belongs to the next chapter. They have effected a complete revolution in the character of Cornish sheep. The table of Mr. Luccock, in 1800, assigns to Cornwall 203,000 short-woolled sheep, producing 3382 packs of wool; that of Mr. Hubbard, in 1828, makes no mention at all of short-woolled sheep, or of short wool, but speaks of no fewer than 5920 packs of *long* wool being yielded by the Cornish flocks.

SOMERSETSHIRE.

Here also the character of the sheep has been completely changed. Luccock assigned to Somersetshire 500,700 sheep, and all of them short-woolled, and producing 9400 packs of wool. There are still a considerable number of short-woolled sheep in various parts of the county, but they have been so crossed with the South Downs, that they may be considered as a variety of that breed. A great many pure South Downs have found their way into this county, and, in a proper locality, are much valued. There is scarcely a part of Somersetshire in which they have not been adopted, and they are particularly valued as grazing sheep. On the eastern side there are a great many Wiltshires, somewhat increased in size, and becoming a very useful breed, and in considerable repute. On the south-east, and penetrating into almost every part of the county, and more numerous than even in their native district, with the exception of the immediate neighbourhood of Dorchester, are the Dorsets. The Devonshire Bamptons occupy the rich grounds extending as far as Bridgewater, combined with the Leicesters, but both of them are long-horned sheep (Mr. Carpenter prefers the old Somerset horned-breed, for open and tolerably good land, they being excellent milkers, and producing early lambs); and towards the north-east were the Mendip sheep, a very peculiar and valuable breed, inhabiting the Mendip Hills*.

A vast tract of uninclosed hill and moor ground formerly existed, stretching from Wells almost to the Bristol Channel, and being part of the great forest of Mendip. The sheep which fed on it bore considerable resemblance to the Exmoor sheep, and to the Dorsets. They seemed to be an intermediate race between the two. The horns were smaller, and the coun-

* Arthur Young gives a curious account of the different mode of treatment of the heavy and light fleeced sheep in the same district, the north-west of Somersetshire, forty years ago. He is speaking particularly of the parish of Monk Silver. He first describes "the polled, large, broad sheep with very thick fleeces," the Bamptons of that time, and already having begun to be crossed by the Leicesters, and he speaks of the great care that is taken of them; and then he adverts to "a mixed and undetermined horned breed, bought when hoggets, at the market of South Molton in Devonshire, in the middle of April, and kept on the hills two or three years for the annual profit of their fleeces, and then fattened on turnips, and sold." He says, "It is a most striking feature in the husbandry of this country," and showing the perfect distinction in the character of these breeds, that "while the former are watched and attended with the most scrupulous assiduity, the latter is altogether neglected, and left, except at the period of fattening, to seek a precarious subsistence on the bleak and often uncultivated hills."—Annals of Agriculture, vol. xxiii. p. 414.

tenance wilder; the sheep altogether more diminutive, the wool finer, and the flesh more finely flavoured than those of the Dorset. They were a hardy breed, and would thrive on the poorest soil. These sheep covered the forest in immense numbers, being alternately changed from the moor to the hill, and from the hill to the moor, as the season required.

They were likewise said to possess, and much more generally, a property that has been spoken of as occasionally observed in the Dorset sheep, that of breeding twice in the year. The period of gestation is about 21 weeks. Supposing that a ewe, a little better kept than they usually are on the hill part of the forest, lambed at Christmas, and the lamb was weaned at Lady-day, if, at the turn of her milk, she was disposed to receive the ram, she would yean again in the early part of June. Whether a strong and healthy progeny might be reckoned upon if this system were pursued, may be a doubtful question; but the Mendip ewes did possess this property, and the so-called sheep of the present day retain it to a certain degree, and are valued on that account.

In process of time, however, a considerable portion of this wild tract of country became inclosed. The number of sheep was consequently materially diminished, and the character of the sheep was changed with the changing character of the land. The old and wild Mendips were now out of place, and crosses with the heavier Devons and with the improved Dorsets, with the South Downs and with the Leicesters, were attempted. These experiments were attended with various success, but the result of them was, that the genuine Mendip breed became extinct, and that there is at this time no breed of sheep peculiar to this part of the country. The object of the Mendip farmer became, so far as his land, even then of very improved quality, would permit, to increase the size of the sheep, sacrificing as little as he could the value of the fleece. The result of this system was, that there being in almost every part of the county a great quantity of land capable of supporting a heavier and a better sheep, Mr. Hubbard's table of 1828 reduced the number of packs of short wool from 9400 to 5200 packs, and added an article, before unknown in Somersetshire, 5200 packs of long wool. From what kind of sheep this new material was derived will be a subject of after inquiry.

In the richer parts of the county, and particularly in the Vale of Taunton, the Devonshire notts prevail; but this is a long-woolled breed, and will be hereafter described.

The Porlock sheep, in the neighbourhood of Minehead, are described by Mr. Barrett of Taunton as very small, short-horned, wild creatures, particularly so when brought from their unenclosed cold homes into better cultivated parts of the country, where they cannot have so much range. It is doubtful, however, whether this sheep should not class with the long-woolled breeds.

GLOUCESTERSHIRE.

Two breeds of sheep might once be said to divide this county between them—the Ryelands, of Herefordshire extraction, and the Cotswolds, with their long and valuable fleece. In 1800, the short-woolled sheep were said to amount to 355,000, producing 5400 packs of wool; the long-woolled were 200,000, producing 6666. In 1828, Mr. Hubbard calculates that more than 15,000 packs of long-wool were produced, but says not a word of the short-wool. The Cotswolds, now merging, or almost lost in the Leicesters, have undoubtedly multiplied to a degree that would scarcely have been thought possible in this part of the kingdom; but still the short-wools were not completely driven out of the field. In the Vale of Glou-

cester, it is true that they are now little seen; but they are not expelled from the hills in the eastern part of the county, nor from those farther towards the north.

The Forest of Dean, an extensive, woody, and uncultivated tract of land, formerly contained a breed that in fineness and feltiness of wool yielded to few. Mr. Ireland of Chalford, in his evidence before the House of Lords, in 1828, and referring to the period when British wools were used in the manufacture of fine cloths, thus speaks of the Forest sheep, and of some other breeds:—"There were three descriptions of wool which we were in the habit of using—the Hereford wools; the Dean Forest wools, which we considered the best in the kingdom; and the Mendip wools, from the Mendip Hills. We made the finest quality of cloth from the Hereford wool alone. It was not until 1824 or 1825 that we began to use the foreign wools, which we could purchase for less money, and which made a superior cloth."

It was want of attention to the cultivation of this wool, or ignorance of its real value, which produced that disgraceful change in it—that perfect destruction of it—which Mr. Ireland thus describes:—"Seven years ago (1821) we used to give 2*s.* 6*d.* a pound for the Dean Forest wools, to make white second-cloths; we must have them free from black hairs: but that is an article we cannot get at any price now. It is not to be procured in the kingdom at all."

An account of the Ryeland sheep will presently be given.

MONMOUTHSHIRE.

The native breed of this county was small, and particularly towards the mountainous parts. The form of the sheep, and the character of the wool, varied with the aspect of the country. The Welsh sheep began to be recognised on the hills, and their mutton was excellent when fatted, but somewhat difficult to fatten. The Brecons a little increased the size of these sheep and the quantity of the wool, but deteriorated the flesh. Luccock describes the wool of the hill-sheep as being "yellow, short, fine, and ragged." The lineaments of the Ryelands were visible in the more cultivated parts; where, also, a larger description of middle-woolled sheep were found. It was essentially a short-woolled district. It contained about 178,000 sheep, and they yielded 1436 packs of short wool.

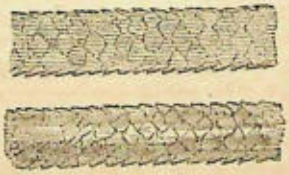
Among the improvers of the Monmouthshire sheep, Sir Charles and Mr. Morgan stand conspicuous. There was scarcely a breed of sheep that was not had recourse to for this purpose. The Ryelands, the Cotswolds, the South Downs and the Leicesters were tried, but none of them succeeded, nor did they answer even in their own pure state. The Merinos were not forgotten, both on the hills and in the vale, but they too failed; and now, either the old breeds have become extinct, or essentially changed, or a perfectly new class of sheep—the Cotswolds, or the Leicesters, or, for this part of the country, a desirable admixture of the two—have taken possession of all the Vale farms, and Monmouthshire is decidedly a long-woolled district. Nothing is said by Mr. Hubbard of the short wools, but Monmouth is recorded as now producing nearly 3000 packs of long wool.

It must not, however, be supposed that the short-wools have disappeared in every part of Monmouthshire; they are found on many of the hills; and the pure South Downs do not amiss on the light and sandy soil in the neighbourhood of Abergavenny. The sheep on the *levels* are of various character. They are usually purchased at the fairs of Glamorgan, but they are seldom wintered here.

HEREFORDSHIRE.

The distinguishing breed of sheep in Herefordshire is the Ryeland, so called from a district in the southern part of the county, on which a great quantity of rye used to be grown, and where many of these sheep were bred. It is a small breed, seldom exceeding more than 14 or 16 lbs. the quarter in the wether, or from 10 to 13 lbs. in the ewe. They have white faces, and are polled; the wool growing close to, and sometimes covering the eyes. The legs are small and clean; the bone altogether light; the carcase round and compact, and peculiarly developing itself on the loins and haunches. The Ryeland has that form which at once bespeaks it to be patient of hunger, and capable of thriving on very scanty fare. It scarcely admits of dispute, that the old Ryeland would endure privation of food better than any other breed. Sir Joseph Banks, who was well acquainted with their constitution and habits, used to say that the Ryeland sheep deserved a niche in the temple of famine. The weight of the fleece rarely exceeds 2 lbs.; but it possesses a degree of fineness unequalled by any other British breed. This cut presents a fair specimen of it. The fibre was taken from a wether belonging to Miss Tomkins, and part of the same flock as the ewe whose portrait is given in p. 261.

Ryeland Wool.



1. *Transparent.* 2. *Opaque.*

The diameter of the fibre is $\frac{1}{700}$th part of an inch, that of the best South Down is $\frac{1}{670}$th of an inch. The number of serrations are 2420, those of the South Down are but 2080; but these serrations are not prominent, nor hooked. The test of the microscope, therefore, assigns to it precisely the situation which the wool manufacturer has done, decidedly superior in fineness and in feltiness to the South Down, but inferior in both of these qualities to the Saxony, the diameter of the fibre of which was only $\frac{1}{800}$th part of an inch, and the number of the serrations 2720. In the construction of the cupping, the unfolding of the seemingly vegetable nature of the serrations, the Ryeland wool bears the stamp of British origin.

This ewe (see p. 261) was bred by Mr. Welles, the author of "Heads of Cattle of the most distinguished Breeds," and to whom the writer of this work owes much obligation with regard to the treatises both on Cattle and Sheep. She was fattened by Miss Tomkins, and weighed 25 lbs. per quarter. It will be immediately observed that she has not the form and general appearance of an English sheep; but there is considerable resemblance between her and the Merino ewe, whose portrait is given at page 154. This, with the peculiar character of the wool, leads to the suspicion that the Ryeland breed may be of foreign extraction.

The Merino breed in Spain was one of those valuable gifts with which the Romans were accustomed to propitiate and enrich the people whom they conquered. It had been naturalized in Spain many years before the Romans had sufficiently subjugated Britain to think of establishing manufactures there; but having once begun to civilize and improve their colonies,

the victors were rarely satisfied until they had perfectly effected their object. The woolly head, the throatiness, the form of the quarters, the whole shape and character of the animal, the mode of treatment, the *cotting* of the sheep—presently to be described—a practice confined to this district and its immediate vicinity, all betray the origin of this breed. When the wool of the Cornish sheep was spoken of (page 254), it appeared that the Hereford breed of sheep was well known so early as the year 1343. It did not, however, then seem to be the most valuable of the British fleeces. The Shropshire wool:—one breed of Shropshire sheep still produces a fleece surpassed only by the present Ryelands, while there is a striking similarity of form and appearance between them and the Ryelands. The Staffordshire:—this county also possessing a breed of small fine-woolled sheep, although now nearly extinct; and the Oxford fleece:—the sheep in this county must have been strangely different from what they are at the present day, in order to deserve such commendation—all these were sold at a superior price to the Ryelands. It is difficult to account for this apparent inferiority at that time, for our earliest writers on the sheep speak of the Ryelands as standing at the head of the short-woolled breeds. If, however, the opinion of Mr. Herbert is correct, some light is cast on the subject. He believes that the Ryelands, almost exclusively, in early times of sheep-husbandry, extended longitudinally through those districts from the Thames to the Tyne, and that the Cotswolds were produced by a cross between the Ryeland and some heavy sheep. The Herefordshire, Shropshire, Staffordshire, and Oxfordshire wools, spoken of in this record, were only varieties of the Ryeland, and of which the Herefordshire happened at the time to be the worst. In the course of years, however, the Ryelands were gradually displaced by a heavier sheep over the greater part of the other counties, but continued to be cultivated in a portion of Herefordshire.

The practice of cotting the Ryelands, although now much neglected, was probably founded, from time immemorial, on the evident utility and humanity of the practice—preserving the sheep from cruel and injurious exposure to cold. During the winter, and especially at the time of lambing, instead of being folded at night in the open fields, they were shut up either in the ground-floor of some unoccupied building, or in a place erected for this especial purpose. They were there fed with hay or barley straw, or pease-haulm, given to them in racks, frequently suspended by ropes, and so contrived as to be easily raised in proportion as the dung accumulated below; for neither the owner nor the shepherd thought of cleaning out the place while there was room for the sheep to go in and out. The Ryeland sheep are fond of the pease-haulm, and fatten upon it; for it is not always threshed clean, and the under-ripe peas are often left unbroken.

The reasons generally assigned for this practice of cotting were—that the wool, being preserved from the injurious effect of sudden change or inclemency of weather, was sounder and finer; that the sheep were in better health; that, especially, they were preserved from the rot; that fewer lambs were lost at yeaning time; that great losses were always incurred when it was attempted to fold the sheep; and that much valuable dung was collected and saved. It is, however, sufficiently evident that the requisite protection of the sheep from cold when yeaning, and at other times, could have been afforded in open sheds, at less expense; that the dung could have been more cheaply carried to the ground, in the usual way of folding, and been more equally spread and better trodden; and that it seems scarcely possible that many sheep should be crowded together during the night, in a close building, and on an accumulating and fermenting heap of dung, without serious loss.

A curious account is given of the settlement of a flock of Ryelands in the Vale of Taunton, where the cotting of sheep at night had never been practised. "The neighbours said they would all be starved. The winter was severe; but the ewes maintained themselves tolerably well, and their lambs at weaning time were in the very best order. The ewes were depastured on the high lands west of the Vale, during the succeeding summer, and came back into the Vale in good store state. One lot was put to turnips; and they were all sold before Lady-day, with almost as much loose fat within them as they were pounds per quarter *."

This last circumstance is characteristic of the Ryeland sheep everywhere. It quickly fattens; but the superabundant fat is not made to load the muscles externally, as in the Leicester,—it is accumulated within; and the flesh is, on this account, more generally acceptable.

It might naturally be expected that attempts would be made to cross the Ryelands with the Merino sheep, since they appeared as if they were varieties of the same breed. The experiment, however, was attended with doubtful success. The first cross evidently detracted much from the beauty of the English sheep, and although it was said that the wool was improved, and the tendency to fatten not impaired, few would believe this when they saw the sheep; and experience proved that the doubters were right.

The Merinos were crossed by the Ryelands, in order to give the new breed not only a less objectionable form, and a greater tendency to fatten, but a constitution by means of which they could be sooner and more perfectly naturalized in England. This crossing was directed to be pursued through five generations, in order that the deterioration of fleece which the first produced might be perfectly remedied. This scheme also was abandoned.

The Ryelands have also been crossed, and that to a very considerable extent, by the Leicesters, but at great sacrifice of the fineness of the wool, while it could be used in the manufacture of cloths. It was likewise thought that the delicate flavour of the mutton in the Ryeland sheep was impaired, and almost lost, although that of the Leicester was improved.

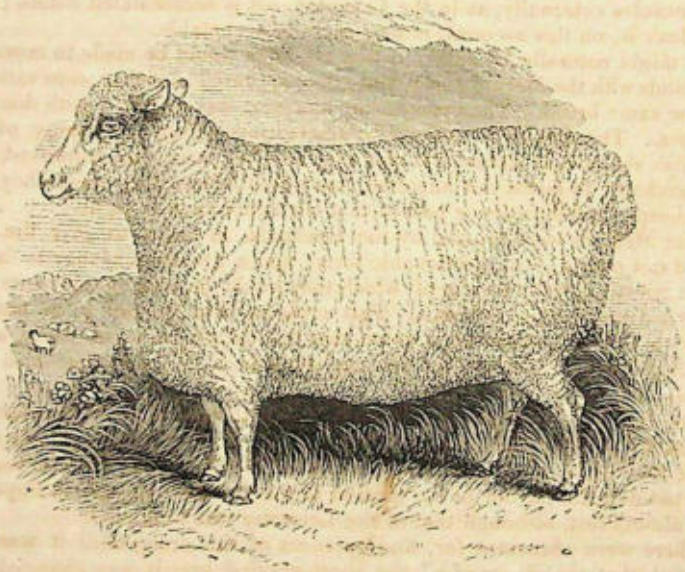
There were advocates for, and opposers of this cross, until it was discovered that the fleece of all the short-woolled breeds was changed, and not only the South Down, but the Ryeland wool was rejected by the manufacturer, even that which was yielded by flocks, the purity of which had been most anxiously preserved; then some persons began to think better of these crosses†. If they lengthened, and somewhat thickened the fibre, they made even the Ryeland a combing wool, and fitted it for other and exceedingly valuable purposes. That is now its character and its destiny; and therefore, even the Ryeland sheep, which could scarcely be much increased in bulk by selection, is enlarged in carcase and lengthened in fleece by careful and repeated crosses. In 1800, Herefordshire contained 500,000 short-woolled sheep, furnishing 4200 packs of wool, the weight of the fleece being 2 lbs. In 1828, the number of packs of short wool had diminished to 2800, but no fewer than 5550 packs of long wool were grown

* Agricultural Magazine, July, 1809.

† At the time when the reputation of the Anglo-Merino wool stood highest, and the Ryeland wool had not begun to be deteriorated, a trial was instituted between these two wools, as to their adaptation for the manufacture of fine cloth. A certain quantity of each was taken, and subjected to the usual processes, and the result is thus stated: "Dr. Parry, the strenuous advocate of the Merinos, thought that the Ryeland cloth was certainly a better and stouter piece in many respects, but that it did not produce so many yards upon the same quantity of wool, arising from its great waste, and its felting so fast in the milling."—Annals of Agriculture, vol. xlv. p. 2.

in Herefordshire, and the average weight of all the fleeces was 4 lbs. Such was the change effected in the very territory and domicile of the finest-woolled sheep that England could produce. This fact speaks volumes as to the revolution that is going forward, and plainly points out the farmer's interest and duty.

A cross between the Ryeland and the South Down has been fairly tried and abandoned. The produce was altogether without merit. The few pure South Down flocks that are in this county answer well, but the pure Leicesters require a better pasture than is generally met with, and more care than a Herefordshire farmer usually bestows on his flock.



Ryeland Ewe.

WORCESTERSHIRE.

When Luccock surveyed this county previous to the publication of his excellent work, he found a sheep in the vale of Evesham producing fleeces that weighed nearly 9 lbs.; but he adds that the sheep of the county are generally small, and the pile is short and well-grown, and of a soft and silky texture. In his table, he calculates the number of short-woolled sheep to be 330,500, the fleece weighing 3½ lbs., and amounting to 4820 packs, but, with seeming inconsistency, says not a word of the long-woolled sheep. The short-woolled sheep were without horns, and with mottled faces, and came originally from Wales. The Ryelands, or Ross sheep, as they were then called, were numerous on the fallows, and the former abounded on the waste ground.

The altered system of sheep-husbandry, and the altered fashion with regard to woollen cloths, has here also completely changed the character of the sheep. Mr. Rushton, of Dudley, says, that the prevalent breed in his part of the country is now the Leicester and the Shropshire grey-faced, the Leicester ram being put to the Shropshire ewe. The produce is better for the

butcher than the pure Leicester or Shropshire; and the wool, although not so long as that of the Leicester, is considerably finer. The opinion of the author of this work, when he surveyed the whole of the county, and particularly the south of it, in 1834, was somewhat different. The breed struck him to be a cross between the Cotswolds and the Leicesters, and the Leicesters too much predominating. Of this some of the farmers were beginning to be aware, for they were breeding a smaller sheep. A few South Downs he saw scattered here and there, and the result of his observation was that he perfectly agreed with Mr. Hubbard, who now excludes the short wools from the county, at least, a sufficient quantity not remaining to deserve notice. The Worcestershire sheep are now, according to Mr. Hubbard, a long-woolled breed, the fleece is 4¾ inches in length, and the number of packs of long wool produced is 6541. Proceeding upwards in a northern direction,

SHROPSHIRE

comes next under consideration. Sheep are principally found in the central, and in the southern and western districts of the county; the north is chiefly appropriated to the dairying of cows, and the breeding of cattle generally. The breeds of sheep used to be as various as in any county of the kingdom, but the circumstances of modern times have now given them a more equal character. The old Shropshire sheep, some of which yet remain, according to Redhead, from whom the greater part of the following description is taken, were horned, and with black or mottled faces and legs. They were about the size of the South Downs, but the neck was longer, and the carcase not so compact. They were hardy, and rarely had food given to them in the winter, except in a deep snow. They now weigh from 14 to 16 lbs. per quarter; the fleece of the wether is about 2½ lbs., but that of the ewe not more than 1¾ lb. They used sometimes to be crossed by the Dorsets. The carcase was increased to 18 or 20 lbs. the quarter, and the fleece to 3 or 4 lbs., but the quality of both was deteriorated: they were, however, thought to pay the farmer better than the old breed.

The common Mountain-sheep, a variety of the last, was smaller, being scarcely more than 10 or 12 lbs. per quarter; but the wool was finer, and sold at a somewhat higher price.

The Clun Forest sheep was a white polled variety, from 12 to 14 lbs. the quarter, and the fleece weighing from 2½ to 3 lbs.

The Shawberry was the smallest Shropshire sheep; and from its diminutive size it used sometimes to be called "the tadpole." The little quantity of wool yielded by this sheep was particularly fine.

The Long *Mynd* or Mound sheep were horned, with black faces, weighing about 12 lbs. the quarter, and the wool being very little inferior to that of the common mountain-sheep. On the hills nearer Wales the sheep were polled, with white faces. They were larger, shorter in the legs, and the fleeces heavier and closer than those of the Long Mynd sheep.

That sheep, however, which was the pride and boast of Shropshire, and not excelled in fineness of wool scarcely even by the Ryelands, was the *Morfe Common* sheep. This tract of land is situated on the borders of the Severn, near Bridgenorth, and contains nearly 4000 acres. The ewes are fed on the common, from the middle of June to October, when the young sheep are brought on it for the winter. The dry or yeld sheep that had been taken into the pastures are brought back to the common in March. From the shortness of the pastures, and the quantity of furze

which is about the common, the sheep begin to lose their teeth at five years old, and are then disposed of.

The Morfe sheep have small horns, with speckled, dark or black faces and legs; the wether weighing about 13 lbs., and the ewe 9 lbs. the quarter, and the fleece weighing about 2 lbs. In many points it resembles, or is a variety of, the Ryeland, and has, almost from time immemorial, been found in various parts of Worcestershire, Shropshire, and Staffordshire.

It was probably this species of Shropshire wool that in 1343 was the choicest and the dearest in England; and at every succeeding period, when mention has been made of it, justice has been done to its excellent quality. It has now shared the fate of every short-woolled fleece. The importation of a better material and the tyranny of fashion have tempted the farmer to cross even this breed with a heavier sheep; and the experiment, however it may have answered to him in a pecuniary point of view, has materially changed the character and the destination of the Morfe fleece.

The Cotswolds and the Leicesters have been introduced into Shropshire, both pure and in various crosses with each other, and they have interfered with and changed the character of every short-woolled sheep; therefore it happens, that although, in 1800, 422,000 short-woolled sheep were found in Shropshire, the fleece averaging 2½ lbs., and the wool amounting to 4400 packs, and no mention being made of any long-woolled sheep, although they might have been found there, few in number, and just beginning to establish themselves, the short wool had diminished, in 1828, to 2400 packs, and no fewer than 5500 packs of long wool were furnished by this county*.

STAFFORDSHIRE.

For much valuable information respecting the Staffordshire sheep, the author acknowledges himself indebted to his friend Mr. Mayer, of Newcastle-under-Lyne. The native short-woolled breed of Staffordshire is known by the name of the Cannock-Heath, or Sutton Coldfield sheep. They are polled, grey-faced, or of every intermediate colour between black and white. The legs are usually of the same colour as the face. They are thin in proportion to their length, otherwise they would resemble more the South Down sheep, from a common stock with which they probably sprung. Their mutton is good, and they fatten with moderate food; at three years old their flesh is equal to that of any other breed. They are capable of growing to a very great weight. Mr. Fowler, of Erdington, in Warwickshire, and of whom honourable mention was made in the Treatise on Cattle, was almost as zealous for the improvement of the sheep as of the long-horned ox. He fattened a Coldfield bred wether to 32 lbs. per quarter; the average weight of the quarter was from 15 to 20 lbs. in the wether,

* The Shropshire short wool must not be quitted without another testimony to the degree of estimation in which it was formerly held. The author of a very interesting and valuable work on the commercial politics of the times, in 1694, uses the following language:—"It is no small advantage to trade, to be fitted with a complete sortment of goods, abounding in the middle sort of wools, excellent of its kind, and suitable to a middle sort of people, which are far the greater number, and herein is chiefly our strength; not that we in the least fall short in the merit of our fine wool, our Herefordshire and Shropshire wool not to be equalled in its kind, by any part of the world, and suitable to almost any degree."—The Interest of England Considered, p. 4.

A page or two afterwards, this author again speaks of the Shropshire and Herefordshire wools: "So comprehensive in excellency is our English wool, that it may be improved to the thickest felt, which will secure from the most violent storms of wet, and be likewise drawn to the finest crape, and still carrying a merit with it, and thereby rendering itself a most acceptable commodity, both in hot and cold climates."—p. 6.

and from 14 to 18 lbs. in the ewe. He acknowledged, however, and it was a proof of his judgment, that the breed was pushed too far in bulk and weight, not only for the pasturage of the common, but of the neighbourhood. The wool averaged about 3 lbs. per fleece. It was fine, closely and compactly covering the carcase, but not of so good a quality as that of the South Downs.

Several attempts have been made to improve the breed. Sir Edward Littleton led the way by the introduction of the Ross breed. The result was the establishment of what is called the Tedderley breed, improved in form by being rendered more compact, their weight somewhat increased, and their wool most materially enhanced in value. Sir Edward kept several hundreds of these sheep, the ewes fattening from 12 to 16 lbs. per quarter, and the wethers from 16 to 20 lbs.; the hind quarters being always good, but the fore quarters light. The ewes were good milkers, and if put on fair pasture at lambing time would render their lambs fit for the butcher before Midsummer, and themselves by Michaelmas. These sheep, taken into pasture and crossed with strong rams, made a heavy breed, and would produce ewes of 20 lbs., and wethers of 30 lbs. the quarter. They were afterwards crossed with the South Downs, and then with the New Leicesters, but with questionable advantage by the latter, for they were rendered more delicate, and the fleece ranked with the long-woolled variety.

On the commons in the west of Staffordshire, there used to prevail, and there is still found, a breed with black faces and legs, light in the carcase, fine in the wool, and the ram horned. They have been improved by means of various crosses, but were always inferior to the Cannock Heath sheep.

The chief flocks of South Downs in this country are on the farms of the Earl of Bradford, Lord Anson, and Mr. Tollett. They were carefully selected from the Sussex South Downs, and from the flock of Mr. Ellman himself. The various flocks of New Leicesters in Staffordshire belong to the next chapter.

A great change has taken place in the character and purposes of the wool. In Mr. Luccock's time, the short wool prevailed. There were 183,000 sheep, with fleeces on the average weighing 2 lbs. each, and producing altogether more than 1500 packs of wool. There were also 3700 long-woolled sheep, producing 113 packs. Now the short-woolled sheep scarcely deserve mention. The fleece has lengthened to 4½ inches, and more than 3500 packs of long wool are grown.

Mr. Ford gives the following account of the sheep in the Vale of Etruria. There is no native breed peculiar to the district, nor any large flock-masters, but a few sheep are kept by most of the farmers, for the sake of having a mixed stock. The lambs are usually fed for the butcher; the ewes are not kept more than a season or two, and this may be considered more as a feeding than a breeding district. The store-sheep are purchased from Shropshire, Derbyshire, Yorkshire, and the Cheviot Hills. Hence result a great many crosses, but the usual way is to make use of the New Leicester ram, whatever be the breed of the ewes.

CHESHIRE.

The river Dee, on the north-east border of Flintshire, divides the principality of Wales from England, and this river being crossed, Cheshire first presents itself. This is by no means a sheep-district, the flocks bred in the county are comparatively few, and they are of all kinds, from the Welsh mountain-sheep to the Leicester. Those which are grazed for home-

consumption are much of the same character. The Leicesters and the Cotswolds, and the Cheviots, however, prevail, and with every variety of cross; but as they are mostly brought into the county for this purpose, they afford only skin-wool, and are not to be taken into account when the character of the sheep and the fleece of the district is inquired into. The sheep that are fed on the heaths and commons of Cheshire, are short-woolled, but the fleece is gradually increasing in length and weight, as elsewhere.

The only variety worth particular record is that found in the forest of Delamere, on the high grounds on the eastern part of the county. They have black, or brown, or grey, or spotted faces and legs, and, usually, small horns. They are not unlike a diminutive Norfolk. They weigh about 8 or 10 lbs. per quarter. The meat is as good as that of other small breeds, and the wool is short and particularly fine, and weighing about 1½ lb. per fleece. They are a variety of the true native breed of England. The wool used to be much sought after by the Yorkshire manufacturers of fine cloths, and still bears a superior price, although it also is excluded with the rest from the finer cloths. The Delamere sheep is out of place in such a county as Cheshire. It is capable of very material improvement, and especially considering the purposes for which wool of this kind is now used.

In 1800, Cheshire was supposed to contain 65,000 sheep; all short-woolled, the length of the fleece various, and producing 926 packs. The wool is still short, the average weight of the fleece 4½ lbs., and the number of packs 1218. This increased quantity arises either from the greater number of sheep which an increasing population requires, or from the increasing weight of the fleece attributable to the altered mode of management, or to the combined influence of both causes.

SOUTH WALES.

It will be necessary now to turn a little to the south and the west, and inquire what kind of short-woolled sheep are found on the mountains of Wales. The first county in the southern extremity, and lying to the west of Monmouthshire, is

GLAMORGANSHIRE.

It presents as great a variety of soil and climate as any district in the kingdom of its size. It is divided into two parts by a high range of hills running through its centre. On the south side is a rich loamy soil, intermixed with gravel and clay; fertile, abounding with beautiful cattle, but unfriendly to sheep. On the north is the mineral portion of the county; mountainous, sterile, and yielding pasture scanty and coarse, but on which numerous flocks of the aboriginal Welsh sheep continue to stray. Although differing from each other in various particulars, the Glamorganshire mountain sheep, and those of Wales generally, are, in all essential points, the same as were described by agriculturists fifty years ago, and have wandered over the mountains of the principality from time immemorial. Some are horned, others are polled. Some are nearly white, and others are of every intermediate hue between a dirty white and a perfect black. They all, however, agree in the following particulars:—The head is small; the neck long, erect, and delicate; the fore-quarters light, with narrow breast and shoulders; the sides flat; the back and loins narrow; the legs slight and long; the animals possessing considerable agility, and an unquiet habit, so as to render them most annoyingly troublesome when attempted to be kept in the small enclosures of the vale. The fleece weighs about 2½lbs. On

the Gellygare and Eglewislan mountains the quality of the wool is fine; but on the hills lying on the western side of the Taff valley it is *kempy*, which considerably deteriorates its value. The breech wool is still more hairy and coarse. It is commonly said that the Welsh sheep are shorn twice in the year. The fact is, that besides the regular shearing in May or June, the wool is clipped close about the neck and fore-quarters at Michaelmas; for all of it would have been lost before the following summer, in the wanderings of the animal among the thickets and furze, in search of food during the winter and spring.

The ewes weigh eight or nine pounds per quarter when fat, which is usually at three or four years old, and the wether averages from nine to eleven pounds. The mutton is particularly well flavoured, and in the months of October and November commands a much higher price than that of larger sheep of other breeds. A considerable quantity of it is sent to the London market. Very few of the sheep are driven direct to the metropolis, but they are sold, wherever a bargain can be struck, on their way along, or are halted and fattened in Worcestershire and Gloucestershire, and sometimes nearer to the metropolis, and particularly in various parts of Hertfordshire, especially about Caldecot Hill; and when they have arrived tolerably ripe, and not more than three years old, they seldom sell for less than a shilling a pound, and more than double that price has occasionally been given for some prime saddles. They are not always real Welsh sheep that are brought to the live market in London; and small sheep of various kinds are often substituted for them by the retail butchers. If nothing worse than a small sheep between the Merino or the South Down and the Scotch, and bred for the purpose of supplying the London market with small mutton, is palmed upon the customer, no very great harm is done, for the flesh of these sheep is exceedingly delicate; and although strange stories are told of various small and worthless carcasses being exposed for sale, the deception seldom extends further than this. The Welsh sheep begin to reach the London markets in greatest numbers some time in July, when the grass is failing on the hills. From the irreclaimable disposition to wander, and from other causes, the breeding of the genuine Welsh sheep has never been profitably pursued in England; but, with a temporary halt on the way, in order to become ripe for the market, there is a regular troop of them always on their march from the principality to the metropolis *.

* Ellis, describing the sheep and sheep-husbandry in the beginning of the last century, thus speaks of the Welsh sheep:—"I am now come to write on the hardiest sheep there are for living in a cold country, and any where else, on that short bite of grass where a large sheep would pine and starve; but they are not the choice of many, because they are apt to straggle and run away. They are a small, short, knotty sheep that come from the poorest living, and thrive and fat presently for the butcher, and become the sweetest of mutton, particularly for a private family's uses, who delight to eat the least and finest sorts. But they must be kept in such counties as Essex and Kent, where they are safely confined by their large watery ditches, and thus prevented straying, and presently made fat. On other ground, before they can be rightly brought to good behaviour, the shepherd must be at abundance of trouble in breaking them to it. Their bodies are so very small that they will get through the sloats of the hurdles, or leap over them, and learn others to do the same, and get into the green corn, and run away, and scarcely be confined in any fold; and are so wild, that they will endure much lugging by a dog before they will yield to discipline: therefore they must be confined by deep large ditches, and always with a full belly of grass, for if they stay any where, they will stay here." He then tells a story to show that they are not much disposed to stay any where:—"A black Welsh sheep had a face streaked like that of a badger's, and being brought up among others into Herefordshire for sale, it was bought by a farmer, who soon lost it. It was afterwards proved that it returned home into Wales, because it was brought up

Many attempts have been made to improve the Welsh mountain-sheep. So far as the principle of selection has been pursued, the sheep-master here, as in every other part of the kingdom, has been well rewarded for his labour, but it has been exceedingly rarely that this principle has been carefully and systematically followed up: no cross, however, has been found so admirably adapted to the herbage and the climate of these mountains as the old sort. Mr. Williams of Aberpergwin has a flock of 1500 Cheviots, which are kept during the summer on the hills, and brought to the low lands in winter; and with this advantage, and good management, they are doing well. In this way they stand the severity of the winter, but they cannot become a part and parcel of the soil like the aboriginal mountain-sheep.

In the *Vale* of Glamorgan the old native breed is nearly or quite extinct. They had, like the others, clean heads; they were long in the body, and high on the legs; they were flat-sided, and narrow on the back. They were, in fact, the same race, but altered or increased in weight by the difference of soil and pasture. They weighed 15 or 16 lbs. the quarter, the mutton was well grained, and of good flavour; but the animal was a slow feeder, and, when arrived at perfection, the fat was not well laid either on the ribs or the back. The wool was improved—it was closer and finer—it was longer in the staple; but still it was a clothing wool. The fleece weighed from 3 to 4 lbs. The only cross that was attempted, and which did not succeed, was with the old Somersetshire, from the other side of the Bristol Channel.

At length the turnip husbandry began to be introduced, and with it the power of keeping more sheep, and of fattening them to a larger size. Various were the attempts which were then made to improve the heavier sort of Welsh sheep, and with general and unexpected success. Some adopted the Leicester rams from the best breeds in Gloucestershire: others, among whom was Mr. Bradley of Cardiff, introduced the pure Leicesters; and by the annual sale of rams which was made by this gentleman they were dispersed over this and the neighbouring counties.

It was, however, soon found—or was imagined at least by some persons—that the Leicesters were too heavy for the soil and pasture which the Welsh valleys could afford, and the Cotswolds were introduced and crossed with the native breed. By these means the carcass and the fleece were thought to have been brought to perfection, considering the locality in which the produce of this new cross was placed.

From the period when this was effected, and until the fatal seasons of 1830, 31 and 32, sheep-husbandry continued in the most prosperous state in the lower districts of every part of Wales. The improvement was particularly rapid in this county, so much so that the breeding of horses, and even of the beautiful Glamorganshire cattle, was comparatively neglected. The mortality of these seasons was a severe check on the industry and the prospects of the farmer. In many places whole flocks were swept away; and although the last two or three seasons have been favourable to sheep, their number is materially diminished, and even the produce of those that remain are not the healthy, thriving animals which their progenitors were. These are facts which have not been pointed out as they ought to have been, and indicate the paramount duty of the Government, and of the agricultural body generally, to interpose some protection against these occasional scourges of

in a Welsh flock a second time, and returned as before; and then being brought up a third time, and sold, it was clearly proved to be the same sheep, to the astonishment of many."—The Shepherd's Sure Guide, by W. Ellis.

the sheep; and that protection can alone consist in a better knowledge of the frame and diseases, and treatment of that animal. The ministers, or the body of men, who would establish in England a school where this might be obtained would indeed deserve well of their country.

By degrees, however, in the better part of the vale, the native breed begun to be laid aside, even though strongly crossed with this English blood, and the flocks were by degrees composed of the Cotswolds and Leicesters alone, or mingling in various proportions. In a fair situation they average, when fat, from 20 to 30 lbs. a quarter, and yield from 4½ to 5 lbs. of wool, of a good combing quality. One of the largest flocks of this kind is at Sully, consisting of nearly 1200 sheep. They are of a larger size, averaging from 25 to 30 lbs. per quarter at two years old, the ewes yielding 5 lbs. of wool, and the tegs 8 or 9 lbs.

In many parts of Glamorganshire, and other of the Welsh counties, there are tracts of excellent down land, and which formerly bore a small breed of fine-woolled sheep, resembling the Ryelands, and their wool bringing from 4*d.* to 6*d.* per lb. more than that from neighbouring localities. These sheep, when the British short-wool ceased for a while to be employed, were neglected, and are now lost. There are, however, some crosses of the South Downs scattered in different parts, and there is a considerable flock of pure South Downs at Duffrin, the property of the Hon. W. B. Grey, which seem to be well suited to the soil and climate, and might be extended with advantage over all the down land, and probably over those thin soils which are not strong enough to maintain a large-sized sheep.

The Welsh lambs are usually not yeaned until March, and before they are two months old they are often separated from their dams. This must necessarily be an injurious practice, for they cannot have acquired sufficient strength to shift for themselves, and if the summer should be unfavourable, they are far more susceptible of disease than they would otherwise have been in the ensuing autumn and winter.

This early weaning is practised for the sake of the milk of the ewes. Although among the most intelligent farmers in every part of Wales this custom is getting into comparative disuse, there are too many who obstinately adhere to it. From the middle of May to that of September the ewes are milked morning and night. About two pints of milk per day are obtained from each ewe, which produce from 20 to 24 lbs. of cheese in the course of the season. The cheese, although rich, has a peculiar flavour, which soon renders it exceedingly grateful to those who are accustomed to it. The milking is usually performed by women, who are paid *in kind*, receiving one-seventh of the produce, or one day's milk per week; and the whey, for the pigs, is supposed to cover the expense of the making of the cheese. Ewes' milk will yield more cheese than the best cows' milk. The general practice is to add one part of sheep's milk to two of cows' skim-milk, and the *mixed cheese*, which is the produce of this, will sell at 6*d.* a pound, when the price of the cheese made of cows' milk unskimmed is about 7*d.*: on the whole, the value of the milk from each ewe during the season is 10*s.* or 12*s.* Much, therefore, may be said for and against the practice of ewe-milking. The weakness of the lambs, and the low condition of the ewes in the autumn, when they are put to the tup, and the little chance there is of their producing twins—these are the objections; but, on the other hand, it is contended that the wether sheep, from these ewes that have been milked, grow as large, and fatten as quickly, as others; and that, although the ewes are certainly lower in condition in September, and few of them have twins, yet scarcely any of them are barren.

There is another custom peculiar to Wales, and which also, in process of time, will be abandoned, namely, the shearing of the lambs in the first summer, and consequently the absence of *tegg* or hoggett wool. The general question of hoggett wool will be discussed in another place; but the Glamorganshire farmers say that, where the enclosures are small and well sheltered, the lamb is sufficiently warm without its coat, and there is less wool lost among the thorns and briars. The quantity of wool, likewise, from the two shearings exceeds that from the single shearing; but no ewe or lamb's wool is so valuable as that of the tegg. The practice of shearing the lamb is not so generally adopted as it used to be, and in many of the largest flocks it is discontinued.

Having treated thus at length of the Glamorganshire sheep, those of the other counties of South Wales may be very quickly described; but the author would be unjust and ungrateful if he were not to acknowledge here, as in the work on "Cattle," the kind and valuable assistance which he has derived from Mr. George David, of Radyr, in Glamorganshire.

BRECKNOCKSHIRE.

The extensive mountains with which Brecon abounds are covered by almost innumerable flocks of sheep, and, in fact, these animals are the chief dependence of the hill-farmer. The same observations apply to them as to the Glamorganshire sheep, except that the flocks are more extensive, the soil is dryer and more healthy, and, there being no minerals beneath, the herbage is finer. The Brecon sheep are more compact in form than the Glamorgans, and yield better wool, and more mutton.

CAERMARTHENSHIRE.

Messrs. Kennedy and Grainger, in their valuable work on "The Tenantry of Great Britain," very properly observe, that "there is not perhaps finer land in Great Britain than is to be found in some parts of Caermarthenshire, either for the summer pasturage of sheep, or the cultivation of turnips for winter food. These advantages, however, are not here of much avail, for whatever requires a little trouble, and is over and above the natural production of the land, is thought quite unnecessary, and is totally neglected." This, perhaps, is strictly applicable to the hill-farmers only, and not to so many of them as formerly. Since the English language has begun to be spoken, at least by a portion of the inhabitants of the principality, they are more aware of the existence and the worth of improvements in other parts of the kingdom, and are not so jealous of the interference of strangers with their long-cherished prejudices.

The mountain-sheep are of the same size and character that they have been from time immemorial; but in the upper inclosed farms, and particularly in the valleys, other and larger breeds have been introduced, and answer well. The Dorset, the Ryeland, the Cotswold, and the Leicester are to be found pure in some parts of Caermarthenshire; and crosses, with various results, have been attempted between most of them and the native breed. The practice of buying in the spring and selling again in the autumn, although frequent, is somewhat on the decline; for agriculturists are becoming more and more aware of the natural resources of the county, and the readiness with which they may be increased. The Cotswolds seem to be most easily naturalized, and to be most profitable in the valleys, for few districts will fully bear the Leicesters.

PEMBROKESHIRE.

This county occupies the projecting western promontory of Wales, between St. George's Channel on the west and north, and the Bristol Channel on the south. The hills are covered with the same kind of sheep as in the other counties, and subjected to the same mismanagement. On the enclosed and vale farms, crosses with the Dorset, South Down, and Cotswold are found, as well as flocks of the pure breeds of each of them. The pure Ryelands also were for a considerable time in high repute. The Leicesters have penetrated even to this extremity of Wales, and have answered in a few favourable spots; but on others they have been found too heavy for the soil and pasture.

CARDIGANSHIRE.

Mr. Little, in his "Observations on Mountain Sheep," gives a singular account of the hill-management of the sheep in Cardiganshire in 1800, of which the following is the substance. There are considerable tracts of bogs and mosses, but the hills are generally dry, and covered with herbage to the very top. A portion only of the sheep on one of these hill-farms belongs to the tenant; but he takes in all he can get for a summer's run, at the price of half the wool; the owners of these sheep having usually some low-lying farm, where a part of them, that may not have been sold, are sent in the winter, and returned to the mountain in the summer. The other half of the wool is supposed to pay the landlord's rent, while the lambs, and the ultimate price of the sheep, are the farmer's remuneration for the winter's keep, the risk, and the capital. In June begins the clipping. The ewes, wether hogs, and lambs are all collected together, and swum in the same pond, until they are supposed to be sufficiently washed. Then comes the difficult task of separating them; and having no dogs that will turn a sheep, and the very characteristic of these mountain-sheep being wildness, it is an almost endless task to separate the different flocks. This, however, being accomplished, and the clipping over, no more attention is paid to them until Michaelmas, when the three-year wethers are sold to the English butchers and graziers. The lambs are never weaned, nor are any of them sold, if it is thought that they can live through the winter. The ewes are always kept, however old, while it is likely that they can bring lambs. Those that were brought from the low-country are sent off as soon as the stubbles are cleared, and the finest-woolled and most delicate of the tups go with them; the stronger and coarser ones stay with the ewes and younger wethers on the hills. Nothing is then done through the winter, except to see that they do not wander too far; but whatever storms may rage, the farmer never thinks of providing for his sheep—they may either live or die; and on this account there are often serious losses, and particularly among the lambs, and the oldest of the ewes.

In the course of a few good years, all the lambs and the old ewes having been kept, the land is overstocked, and the flock pines away, or various diseases break out among them. If a severe winter follows, a considerable portion of them perish, especially of the lambs and the old sheep; and even the younger ones are barren—and there are no lambs at all, and the farmer complains of his bad luck; but such luck he is almost sure to have once in every three or four years. The management of the land is equally bad with the management of the sheep. No one thinks of draining the parts which he knows full well give the rot to half his flock. No one raises any artificial shelter, even in the bleakest situation. The dead

covering of the moor is never burned, and no part is enclosed; but everything is allowed to continue in its natural state.

There are some parts of Cardiganshire and of the Welsh mountains in which the management of the sheep is not essentially improved at the present time; but they are rapidly diminishing. Few things have more contributed to effect this than the translation into the Welsh language of some tracts of plain instruction on the most useful branches of husbandry. To the patriotic men, and especially in North Wales, who have attempted and effected this every well-disposed mind will wish increasing success.

In the upland districts, on the north of the county, the wool is of a longer staple, and coarser than it is towards the south. Below Airon the wool is shorter and thicker on the carcase, but otherwise the sheep are of the same description as in the other counties of Wales,—or, if there is any difference, the soil and the climate of Cardiganshire seem to be peculiarly adapted for sheep husbandry.

RADNORSHIRE.

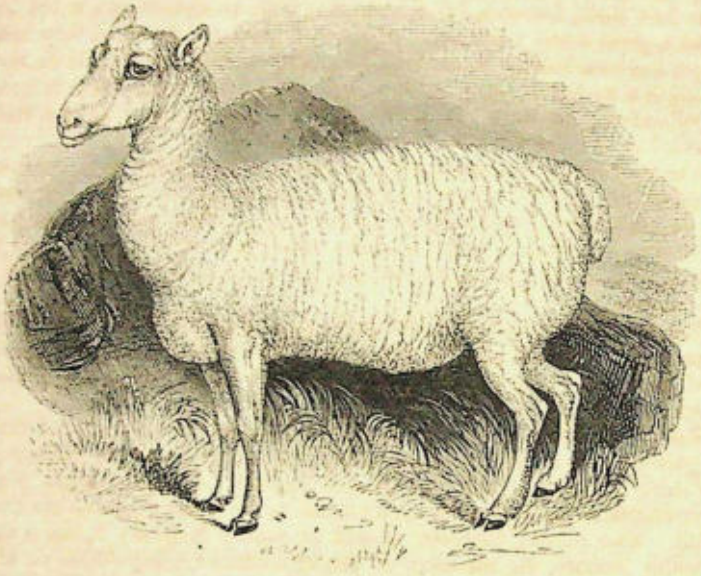
The flocks of sheep in this county are numerous, and not inferior to those in the other districts of South Wales. Their general character, and treatment, and produce is the same; and it is needless to add anything to the account already given of the South Wales sheep, except to correct an error of Mr. Luccock—a writer usually very accurate, and on every point regarding the fleece of the sheep communicating the most valuable information. Giving a rapid and off-hand sketch of the different varieties of British wool, Mr. Collins says that "the Radnorshire wool, compared with the Shropshire, is thicker, harder, filthy, and more sandy*." Mr. Luccock, evidently quoting from him, says that the Radnorshire fleece, compared with the Glamorgan, is "thick-haired, filthy, and sandy." This is not true: for many of the Radnorshire flocks will vie with the best of the Glamorgans; and, on an average of the whole county, the Radnorshire is the superior wool.

Luccock, writing in 1809, says that "throughout the whole principality wool is manufactured in the houses of those who grow it, and the consumption for articles of dress and of furniture must be considerable. The people of both sexes are clothed in woollens, and most commonly wear a great quantity of them. In the north, females are generally seen in felt hats, and large blue cloaks; those of the south are fond of exhibiting the various-coloured borders of two or three petticoats, and wear upon their shoulders a square piece of red cloth." Time and fashion, and the change which has taken place in the fleece, have effected great alterations in these particulars. Much flannel is still made in Wales, and particularly in North Wales—also some kinds of coarse cloths, both strong and small; but with the exception of stockings and socks, the manufacture is comparatively rarely carried on in the farmer's house, or in any private habitation, but is much more cheaply and better effected in the manufactories, on a great or small scale, which are now established in almost every part of the kingdom.

According to the computation of Mr. Luccock, South Wales contained 2,035,000 acres, on which were fed 683,000 sheep,—producing 5700 packs of wool. The principal marts for wool in Wales are Llanrwst and Bangor. Mr. Hubbard has not made any alteration in this statement; but, while the short-wool has not perhaps diminished to any considerable degree, a considerable quantity of long-wool is now grown in the southern part of the principality.

* Agric. Mag., May, 1803.

NORTH WALES.



The Polled Welsh Sheep.

As, when describing the cattle of North Wales, it seemed to be most probable that in Anglesey, at the farther extremity of the principality, and separated from the main land although but by a narrow channel, we should find the original breed,—or, at least, with the smallest degree of admixture,—so the inquiry respecting the sheep of North Wales shall commence at the same place.

ANGLESEY.

The old farmers say that the breed longest ago remembered were freckled-faced, with a fair proportion of wool, neither long nor short; and the Rev. James Williams of Treffos, a skilful and zealous improver of the Cambrian sheep, relates, that when he first imported the South Downs, some of the old people said that they resembled the former sheep of the country, only they were blacker in the face.

These sheep seem in process of time to have undergone some, although very trifling, change; for the likeness to the unimproved South Down is yet too striking to escape observation. They are long in the neck, light in the brisket, narrow and loose in the loin, too steep and short in the hind-quarters, and too high on the leg. They are mostly without horns—the face sometimes of a dusky white, or yellow, and sometimes freckled with dusky yellow; the yellow and silky-faced ones having the finest wool, and the wool generally approaching to the character of the South Down. The average weight of a good Anglesey wether, at two years old, is from 16 to 18 lb. the quarter. The above cut is a fair representation of this species of Anglesey sheep.

"I have lately heard," says the Rev. Mr. Vincent, of Gorddinog, (from whom the author has received much valuable information on the subject of the Anglesey sheep, and whose almost unsolicited kindness he begs to acknow

ledge,) "that, in the northern part of Anglesea, there exists a variety of sheep with dark faces, descended from some that were brought from a wreck on the coast a great many years ago. They still preserve the dark face, and are larger and have heavier fleeces than the greater number of sheep in the county. There is a variety of sheep in Anglesea with a white face, which is by some called native; but from all the inquiries I have made, I suspect that the freckled or dun-faced is the oldest."

The wool of some of the native Angleseys is very fine: it is even equal to the South Downs. They also have great aptitude to fatten; at least, to lay on fat inwardly, and that at an early age. They uniformly surpass in proof any expectation which a person unacquainted with them could form from their outward appearance, and this has made them great favourites with the butcher.

The ewe is remarkably prolific, producing commonly two lambs; and she is so good a nurse as often to fatten them for the butcher on very ordinary food, and afterwards to afford a considerable quantity of milk for cheese-making.

Possessing all these valuable qualities, it is much to be regretted that the Anglesey sheep should be so neglected as it is by most of the farmers; but the same carelessness and idleness and jealousy of improvement pervade the common Anglesey farmer, as are found in the greater part of the Principality. One excuse, however, should be made: Anglesey is not a sheep-breeding country, the attention of the agriculturist being chiefly or almost exclusively directed to the raising of corn, and the growing of black cattle. In consequence of this, the poorest and most exhausted portions of many of the farms have been allotted to the sheep, and no provision of artificial food is made for their winter support. If, therefore, so little pains have been taken with regard to their keep, it can scarcely be expected that much or any attention would be given to the improvement of the breed by careful selection; nor has it been so given, any farther than it was a common rule to select the largest ram for a tup, with some reference indeed to his own individual form, but without consideration as to his descent, or the quality of the flesh or the wool.

There were, however, some praiseworthy exceptions to this system of total neglect. The principle of selection was, perhaps, never followed scientifically, and to its full extent; but many efforts were made to improve the Angleseys by the introduction of foreign stock. Thirty years ago, Mr. Price of Cadnant imported the new Leicesters pure, and afterwards endeavoured to establish a cross between them and the Angleseys; and his sheep were not kept on the starving system too prevalent in this island, and in Wales generally. It was his decided opinion, that the native breed was more profitable than either the pure Leicesters, or the cross with the Leicesters. The experiment has, however, been lately repeated by Sir R. W. Bulkeley, and to a very considerable extent with decided success. The Rev. Mr. Pritchard of Dinam had for many years a valuable flock of Angleseys crossed with the Leicesters, until they had the appearance of pure Leicesters. He is now crossing these with the Cotswolds. Mr. Evans has pursued the same experiment.

Mr. Williams of Llanidan purchased some Merinos with a view to improve the Anglesey fleece; but the experiment did not answer his expectation. The fleece was improved, and there are some sheep, even at the present day, who give evidence of Merino descent by the characteristic tuft on the head, and still more by the fineness and yolkiness of the wool; but the produce of the cross was in other respects so inferior, that the increased

value of the fleece was not sufficient to counterbalance the loss of constitution and hardiness.

The late Lord Bulkeley imported some of the black-faced Derbyshire sheep: they were hardy and active, but inferior in wool to the natives, and not superior to them in any other respect. He tried the South Downs, as did some other spirited agriculturists nearly at the same period; the result of this was not perfectly satisfactory.

The white-faced Yorkshire sheep were tried by Mr. W. P. Lloyd, and in his opinion the weight of the native fleece was increased without its quality being deteriorated, and that of the carcase without diminishing the hardiness of the animal.

Last of all, and promising considerable success, Mr. Evans and the Rev. Messrs. Pritchard and Vincent have introduced the Cotswolds. The experiment is under trial, but the Cotswolds are more hardy, and active, and thrifty than the Leicesters, equalling them in fleece, and not so likely to disappoint as breeders.

While many valuable sheep have crossed the passage from Anglesey to Caernarvon, this county has furnished the island with a small breed, or with a variety of the breed common to both, which does not average more than eight or nine lbs. the quarter, and the fleece not weighing more than one or one and a half lb. This sheep, on account of the delicacy of its flesh, is in some request in gentlemen's establishments and parks *.

CAERNARVON.



The Horned Welsh Sheep.

* An old writer on the agriculture of Anglesey gives a curious account of the manner in which the sheep of this island are occasionally prevented from exercising their natural tendency to break bounds and to wander. "They are put in fetters made of straw or hay, neatly plaited, by which the fore and hind legs are bound together on each side. They seem to feel great uneasiness from this bondage, and in wet weather are often galled by it. When under such restraint and pain," he adds, "it is impossible that they can ever thrive." Kay's Survey of Anglesey.

The sheep-farms in Caernarvonshire, and most of the counties of North Wales, usually comprise both summer and winter pasture; or where the cultivated parts, or the sheep-walks, are disproportionately large or small, the neighbouring farmers accommodate each other. The flocks are generally all mingled together without any distinction as to age; the wethers are sold at four and five years old, and very little attention is paid to the quality of the wool. Although the sheep and their wool almost ever form the principal dependence of the farmers, and in the uplands constitute their sole hope, yet these animals are almost abandoned during the winter on the bleak hills, and the protection afforded by smearing has never been resorted to in these districts. The above cut is the portrait of one of the best kind of Caernarvonshire sheep, and especially of that kind with which the London market is chiefly supplied. A few of the farmers, however, keep their flocks at home during the winter, and others hire winter-pasture for the yearlings, at the rate of about 1*s.* 6*d.* per head. Where neither cattle nor corn are produced it is calculated that the rent should be defrayed by the price of half the wool. It was the acting on this calculation which, when the price of wool so rapidly fell at the commencement of the change in the manufacture of this material, lessened the value of land full one-fourth, and ruined so many of the tenants. Messrs. Kennedy and Grainger, writing in 1829, state that what were then considered remunerating prices in the mountain farms of North Wales, were from 14*s.* to 16*s.* per head for wedders; 5*s.* to 6*s.* for ewes; 6*s.* to 7*s.* for lambs; and from 10*d.* to 1*s.* per pound for wool.

Caernarvon is one of the most mountainous counties in North Wales, but, fortunately, the hills are green to the very summit, and are covered with fine, although short, pasture for the sheep. On the Anglesey side of the county the breed is comparatively large, averaging from fourteen to sixteen lbs. per quarter, but the natives of the hills seldom weigh more than eight or nine lbs. Luccock averaged the fleece of the hill sheep at somewhat less than two lbs., which probably is about the weight of it at the present time.

MERIONETHSHIRE.

This county is situated on the south and the east of Caernarvon, and also on the borders of St. George's Channel, and is almost as mountainous and wild as Caernarvon. Sheep-farming is the staple business of the agriculturist, and if any comparison could with certainty be made, it might be affirmed that the Welsh sheep is found in a greater state of purity in Merioneth than in any other county, although they are evidently capable of great improvement by a proper selection of rams, and few attempts of this kind have been made for more than a century back. The utmost that the farmer has done has been to send occasionally for a ram to Tallyllyn, at the foot of Cader Idris, where the purest and best blood in North Wales is supposed to be found. The Tallyllyn sheep are somewhat larger and longer-bodied than the common breed.* The true Merioneth sheep is small with light bone. The wether is fattened at five years old—he does come to his best at an earlier period. The weight rarely much exceeds 10 lbs. per quarter, but at that age the flavour and quality of the meat are excellent, particularly when fattened upon the mountains.

The sheep are here also clipped twice in the year, not because it is supposed that more wool is obtained either by natural growth or by its being

* Kay's Statistical Account of Merionethshire.

preserved from the briars, but, contrary to actual experience (vide p. 68), because it is imagined to be of a finer quality. The weight of the fleece does not on an average exceed 1½ lb., but the quality is good, and well adapted for and chiefly used in the manufacture of Welsh flannel.

Some attempts have been made of late years to cross the Welsh sheep with the black-faced Scotch; but both one and the other seem to lose their original character, and the produce is inferior to both of the progenitors. We are thankful to Mr. Sharp, of Rhagatt, for some valuable hints on this subject.

The ewes are usually brought down from the hills in order to lamb, and the lambs are fed in the valleys during the first winter; but, with these exceptions, the flock is usually kept on the mountains during the whole of the year. Under this management the sheep are rarely ripe until they are three or four years old. The lambing season is in March and April.

MONTGOMERYSHIRE.

The hills of Montgomery are also covered with sheep, which are sent in the spring from all parts of the low country. The farmers in the neighbourhood send their whole flocks; the wethers and hogs alone come from those at a greater distance. The strongest wethers remain on the mountains during the winter, and without the slightest artificial provision for their support: the others are brought down into the low grounds about Michaelmas, to be returned in the spring. Under such a system of management the native breed can scarcely be kept pure, and there is much difference in the character of the sheep that occupy these wastes. Towards the south and west a small white-faced breed prevails; on the north-east a black-faced native breed, scarcely larger than the white-faced ones is found, and much valued on account of their hardiness. The breed in the valleys has undergone greater change, and has been materially improved, principally by sheep from Shropshire.

The sheep on the higher grounds are not in perfection until four years old or more; those in the valleys are sooner fit for the butcher. The former weigh about 10 lbs. the quarter, the latter 12 or 14 lbs.; the fleece of the former, clipped once in the year, weighs about 1½, the latter 2 lbs. The lambing season is in March; seldom more than one lamb is produced, and that one well woolled; the lambs are shorn in August, and the greater part of the wool sent to Shrewsbury to be manufactured. There are, however, considerable woollen manufactories within the county; and, on the whole, the wool of Montgomery is equal to any that the Principality will produce.

DENBIGHSHIRE AND FLINTSHIRE.

Of the sheep of these two counties, bordering on Shropshire and Cheshire, little needs to be said. There are fewer sheep in them, and particularly in Flintshire, than in any of the other counties, and these few are of various breeds, more or less mixed with breeds of English extraction. The weight varies from 10 to 20 lbs. per quarter, and the fleece from 2 to 5lbs. There is, however, more artificial food than in the other parts of North Wales, and a great deal more than there used to be a few years ago.

Mr. Luccock, in his account of the wool in North Wales, states the number of acres in that part of the Principality to be 2,285,000, the sheep 571,000, or about 1 to 4 acres; and the total number of packs of short wool yielded by them 3570. Mr. Hubbard admits the accuracy of this calculation, but says nothing of the small portion of long wool which is now grown in this district.

LANCASHIRE.

A great part of this county is too thickly inhabited, and too exclusively devoted to manufactures, to leave room or inclination for the breeding of sheep; and south of the Ribble there are few found, except those that are grazing for the butcher. Even in the western and northern parts of Lancashire the flocks are few and neglected. Luccock says, that "some flocks are kept upon the mountains, in a very poor and neglected condition, and others are found on the low and fertile pastures of the west; but the stock of sheep is small and ill-attended, and the wool is very dirty, and coarse, and kempy, and the greater part of it possesses all the bad properties of that kind which is produced by the neglected mountain sheep*." This is very severe criticism, and doubtless was perfectly just at the time. More attention is now paid to sheep husbandry, but not so much as it deserves.

The prevailing breed is what is here called the Woodland Horned sheep, a variety of the heath or mountain sheep, which, beginning to appear on the hilly country on the Yorkshire side of the county, are spread over the whole of the north, to the very extremity of Scotland. They are found pure, or with almost every variety of cross; but the principal crosses, and which are decided improvements, are, according to the nature of the country, with the Leicester or the South Down, and by means of which both the carcase and the wool are increased in weight and value. Both of these sheep, and also the Cheviots and the Cotswolds, are found here. In the neighbourhood of Garstang the Cheviots are numerous. A few Ryelands are kept near Preston, and although so much farther north than in their native country, they are never cotted: they feed and fatten well, and their wool maintains its full reputation.

Towards the borders of Westmoreland the Silverdale breed of sheep are found. They are natives of that part of the country, and singularly confined to it. It is a horned breed, with white faces and legs, depasturing on a rocky limestone land. The wool is long and white, and the sheep fattens kindly; but with all its superiority over the darker neighbouring breeds, the Silverdale sheep is far inferior to the Cheviot.

According to Luccock, Lancashire contained 310,000 short-woolled sheep, the fleece averaging 3½ lbs., and producing 4522 packs of wool. According to Mr. Hubbard, the number of sheep is the same, but the fleece has increased to 4½ lbs., and 5812 packs of wool are grown. Surely there is a sufficient quantity of long wool grown in this county to deserve some record of it.

WESTMORELAND.

The sheep on the mountains and commons are alone referred to at present. They are of the same character as those on the hills of Lancashire, and if the account given by Mr. Lawrence could be credited, the management of them would be a disgrace to any country; but while the sheep on the lower grounds have been crossed and improved, and rendered truly valuable, those on the hills, although comparatively neglected, have not been quite stationary. Luccock computed that there were 223,725 short-woolled sheep in Westmoreland, the fleeces of which averaged 3½ lbs., and the whole amounting to 3262 packs. Mr. Hubbard imagines that the average length of the staple is five inches, and the number of packs 4660, evidently taking it for granted that the number of sheep had increased in Westmoreland, yet giving no account of the great number of long-woolled sheep first introduced by Mr. Culley, and with which the better pastures are now covered.

* Luccock on Wool, p. 316.

CUMBERLAND.

This county, and especially the southern part of it, is truly mountainous, the sheep are there kept on the highest grounds during the summer, and driven in the winter to better pastures. On the less elevated ridges they are left to abide the pelting storm, without the slightest shelter, or the smallest supply of artificial food.

The march of improvement was as slow in Cumberland as in the counties that have been just described. Messrs. Bailey and Culley, in their excellent Survey of Cumberland, were observing some singularly rough-legged, ill-formed sheep. On asking an old farmer whence they got that breed, or where they obtained their tups, he replied, "Lord, Sir, they are sik as God set upon the land, we never change any." "The latter part of this simple statement," say the writers, "we readily believe; but that God set upon the land such ill-formed, unprofitable animals, we cannot so easily assent to, but rather think they have acquired their present deformity and bad properties, by the indolence and ignorance of their owners."

Most of the tups used to be procured from Kentmore, with narrow backs, long and thin carcases, large and rough legs, and coarse hairy wool hanging from their throats to their breasts, giving them more the appearance of goats than sheep. The work of improvement had, however, commenced even in the time of these authors. The hills would not be quite neglected when the Leicesters began to people and to enrich the vales, and in the history of the next county it will be seen what these mountain sheep have now become.

The HERDWICK is the most valuable sheep on the mountains of Cumberland. In the beginning of the last century a ship was stranded on the coast of Cumberland, that had on board some Scotch sheep which seem to be now unknown in that country. They were got on shore, and being driven up the country were purchased by some farmers who lived at Wasdale-head, in the neighbourhood of Keswick. They were small, active, polled, and their faces and legs speckled, having a great proportion of white, with a few black spots strewed upon it. They were turned at once upon the neighbouring hills. They had not been there long before they evinced a peculiar sagacity in foreseeing the approach of the snow-storm, for, a little before its coming, they clustered together on the most exposed side of the mountain, and where the violence of the wind usually prevented the snow from lodging. This instinct caused them to be regarded with a degree of interest, and almost of superstition; and their excellent qualities, and adaptation to their new situation, became speedily evident. Their fleece was considerably finer than that of the common black sheep, and the matted quality of the wool enabled them to endure any severity of weather, and even to pass the whole of the winter without the smallest quantity of hay being expended upon them. They were continually moving about, and therefore rarely or never overwhelmed by the snow; and by their ceaseless activity they scraped away the snow, however deeply the herbage might be buried under it.

The proprietors of these useful animals determined to keep them as much as possible to themselves, and they formed an association, one of the regulations of which was, that they never should sell a ram, and not more than five ewe-lambs in one season. Means, however, were soon found to elude this illiberal and shameful monopoly, and the sheep gradually found their way to several of the mountainous districts of Cumberland and Westmoreland. They were called the *Herdwick* breed, from

the supposed custom of farming out a flock of sheep to a herdsman, who was to retain a certain number of them in lieu of wages. They give little trouble in the rearing and management of them. The lambs, which are not dropped until May, are well protected by wool. The wethers are in their prime at three and four years old, and then weigh from 10 to 12 lbs. a quarter, and the ewes from 7 to 9 lbs. Notwithstanding the scanty herbage on which they are fed, they are slaughtered as they come from the hills, and are supposed to be most in season, and their meat to possess a superior flavour, from June until September, when the heath plants are in bloom. The ewes are kept as long as they will breed, and are often ten or fifteen years old before they are sent away. The principal value of this breed is its hardiness; and it was in order to improve this quality in other breeds, that the Herdwick rams were once so much sought after by the breeders of the mountain sheep.

The cross between the Herdwicks and the native mountain sheep is variously coloured about the head and legs, some being white and others speckled, and not a few perfectly black. They are horned, high-shouldered, narrow-backed, flat-sided, and with coarse and rather long hair.

Mr. Luccock estimated the number of sheep in Cumberland to be 378,400; the fleece 3¾ lbs. in weight, and the number of packs of wool 5915. Mr. Hubbard states the present weight of the fleece to be 5 lbs. and the number of packs 7883. Although the latter gentleman says nothing of the long wool grown in Cumberland, yet many flocks of Leicesters are established in the level country, and, as they deserve, are highly valued.

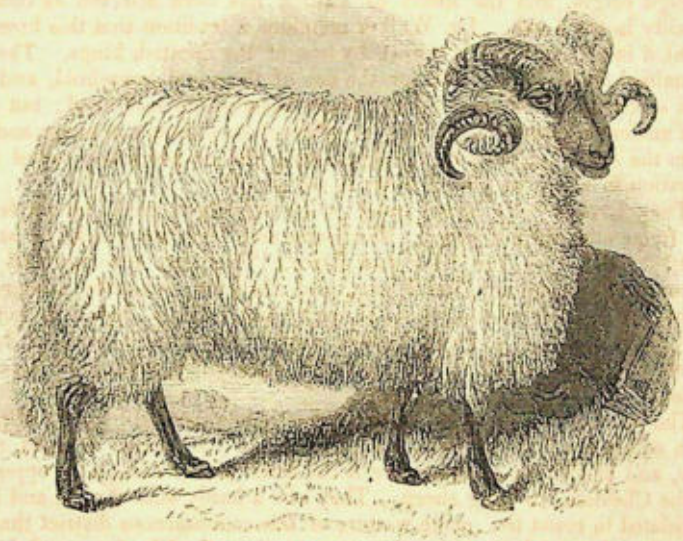
NORTHUMBERLAND.

In this county, although the northernmost in England, scientific husbandry seems to have fixed her chosen residence. It is occupied by the three breeds of sheep which divide not only it, but the whole of Scotland among them. In the western part of Northumberland, and in most of the alpine and bleak and barren districts of Scotland, the black-faced sheep mostly prevail. The Cheviots occupy the hills of that name in Northumberland: they are found on all the upland and grassy districts, and they are successfully contesting the possession of many of the more elevated and exposed situations. In Northumberland, in the whole of the south of Scotland, and far towards its northern extremity, the new Leicester sheep graze on the plains, and will not yield in purity of blood, or in any valuable quality, to those found in any district in England. In the time of Luccock the Leicesters do not appear to have penetrated so far northward as Northumberland; but the breeds of sheep were exclusively short-woolled, amounting in number to 538,162; the fleece weighing about 5½ lbs., and the county yielding 12,333 packs of wool. At present the fleece is of nearly the same weight, but the black-faced sheep have comparatively disappeared. The Cheviots are not so numerous as they formerly were, but the Leicesters have been cultivated wherever the soil and its produce will support them. Thence it has happened that the number of packs of short wool has diminished to 6167, and 6166 packs of long wool are now grown.

SCOTLAND.

As these three breeds of sheep, with some trifling varieties of form, and weight of wool, occupy the whole of the country north of the Tweed, it would be tedious to enter into the consideration of the sheep-husbandry of each race. A general history of the middle-woolled black-faced sheep, and the short-woolled Cheviots in this chapter, and of the long-woolled Leicesters in the next, will answer every useful purpose.

THE BLACK-FACED OR HEATH SHEEP.



The Black-faced Sheep.

We have begun to observe them on the mountainous parts of Lancashire; we have traced them through Westmoreland and Cumberland; and they are found in many parts of Nothumberland, and over the whole of Scotland. It is doubtful whether they are the aboriginal breed of these districts. Mr. Culley, and he is high authority, imagines that the DUN-FACED sheep were the early inhabitants of this mountainous range, and some of which now remain. Their faces are of a dun or tawny colour; the wool is fine, and mixed and streaked with different colours. They are polled, small in size, weighing, at four or five years old, not more than 7 or 8 lbs. a quarter, the flesh being of excellent flavour. They are hardy and require little trouble; but in every essential quality, except the fineness of the wool, they were far inferior to the black-faced *.

There can be no doubt that a breed of sheep, producing wool far superior to that which the black-faced sheep now yield, was once common in Scotland. Dr. Anderson proves that, three or four centuries ago, a fine woolled breed of sheep was common in Scotland. It prevaled in Annandale, Niddesdale, and Galloway. It lingered longest in some of the mountainous parts of Aberdeen. It was known not fifty years ago in Fifeshire, and at present the Fifeshire is a mixed breed. If any trace of it now remains, it is in the islands of Shetland †.

* Culley on Live Stock, p. 160.

† Hector Boethius, who wrote about the year 1460, takes notice of the fineness of the wool produced in various parts of Scotland. Speaking of the sheep in the vale of Esk, and where of late, until the introduction of the Cheviots, the rough-woolled black-faced sheep alone were found, he says, as translated by Hollingshed, "Whose sheep have such white, fine, and excellent wool, as the like of it is hardly to be found again in the whole island." Sebastian Munster, in his Cosmographia Universalis, published ninety years afterwards, says, "The sheep pasture in each country (he is speaking of England and Scotland) is such that no where is there better or finer wool." It is somewhat difficult to account for the thorough and disgraceful change; but the knowledge that it has taken place should stimulate the sheep-masters of Scotland once more to vindicate the honour of their native fleece.—Anderson on Sheep, Appendix ii.

It is a common belief in Scotland, that the black-faced sheep are of foreign origin, and the forest of Ettrick has been selected as their first locality in the north. Dr. Walker mentions a tradition that this breed was planted in a farm on this forest by one of the Scottish kings. The flock contained 5000 sheep, kept for the use of the royal household, and from that stock the whole race of the black-faced sheep succeeded; but where this ancient monarch found a breed of sheep so different in shape and wool from the old inhabitants of the mountains, and so admirably suited to the situation in which he placed them, is not stated*.

They have mostly horns, more or less spirally formed, but the females are frequently without horns. The faces and legs are black, or at least mottled; the eyes are wild and fierce. They are covered with wool about the forehead and lower jaw, and the wool generally is somewhat open and long, and coarse and shaggy; not so long, however, but that the sheep may be properly classed among the middle-woolled breeds. There is a hardness of feeling about the wool which materially lessens its value.

The form of this sheep has been considerably improved by good selection, even within the last few years, and the carcase has become so short, round, firm, and handsome, as to acquire it the name of *short* sheep, in opposition to the Cheviots, or *long* sheep. They are a hardy active race, and better calculated to resist the severe winters of this mountainous district than any other breed, or at least with only one exception, the Cheviots; and the propriety of that exception is to be presently inquired into.

Those of the best descriptions are bred chiefly in the hilly districts of the south of Scotland, where breeding stocks can be profitably kept, and are, when designed for grazing, bought while lambs, or at one year old, from the breeders, and kept on the Grampians, or other similar pastures, until they are three years old, when they are sold to the low-country farmers, in order to be fattened on turnips, and sent to a near or distant market in the following winter or spring.

Lanarkshire may be considered as the nursery of the black-faced sheep for the more northern counties. A great many ewe-flocks are kept in this county; and the wether-lambs are sold to sheep-farmers in the mountainous districts. The age at which it is wished that the ewe should produce her first lamb is two years; but the flock being suffered to run together, many of them have lambs at an earlier age, and when they are not strong enough to endure the severity of the climate. This being almost exclusively a breeding district, some approach towards a proper care of the flock is made. Circular open stalls or pounds, the wall being five or six feet high, are erected, and in a few places this wall is surrounded by fir-trees. The sheep and the shepherd may here find some protection against the pelting storm. It is the commencement of improvement in this respect. A little more provision will by and by begin to be made for their winter fare. Their continuance in the stall will never be compulsory—they will be suffered to pursue their own tract, if, as it is said, they will not be put out of the way of it as long as by any means they can supply themselves, while refuge and food will always be accessible when the grass is too deeply covered with snow for them to get at it.

Since the regular passage of steam-vessels from Scotland to the English metropolis, great numbers of these sheep have been sent to Smithfield, and they are rapidly becoming favourites in the London market, on account of

* Farmer's Magazine, Feb. 1824.

their resembling, more than any other breed, the South Down and Welsh mutton in the fineness of its grain and the delicacy of its flavour. The nature and variety of the herbage on which they are fed during summer, and the age they must arrive at before they are fattened, sufficiently account for the fineness of the mutton. The greatest fault found in them by the southern butcher is the thinness of the shoulder.

The present price of lambs, from the breeder, is now (May, 1836) from 7*s.* to 12*s.*; hoggets, or one-year olds, will bring from 14*s.* to 18*s.*; and at three years old they are worth from 20*s.* to 25*s.* This throws much light on the present state of sheep husbandry in these districts, for, taking into account the unavoidable loss by disease and the severity of the climate, the highland grazier has little more to look to than the annual clip of wool for the payment of his rent, the expenses of herdsmen, materials for smearing, and a piece of wintering ground in the lower districts during the severest part of the season, so that his profits (although, from the demand for coarse wools, they have lately been fair) must always be precarious and fluctuating. When the sheep are put out to winter pasture, the expense is calculated to be 1*s.* 6*d.* or 2*s.* per head *.

The weight of one of these sheep, when fattened, is from 16 to 20 lbs. per quarter, and the weight of the wool laid or unwashed is about 5 lbs., and that of a fleece of white or washed wool 3 lbs. When the price of white wool is 11*s.* the stone, that of laid wool is 8*s.* 6*d.* The turnip feeder thinks himself well paid if he gets at the rate of 2*s.* per month, in addition to the benefit which the land derives from the manure. Some prize sheep, shown at the meetings of the Highland Society, have been brought to 40 lbs. per quarter; but it is, if possible, more uniformly true of the Highland sheep than of other breeds, that when they are forced beyond their natural size, the meat becomes coarse, and the flavour is lost. The preferable size of one of these black-faced sheep is about 16 lbs. per quarter.

The improvements that have been made in the black-faced sheep have mostly been effected by judicious selection. The crosses have generally failed, even those with another excellent mountain sheep, the Cheviot. The advocates of both breeds acknowledge this. They confess that "a good sheep is never produced from their being crossed, but the offspring is always ugly and ill-shaped†." "To effect a change in the old forest breed," says Mr. W.

* Messrs. Kennedy and Grainger, writing in 1829, thus compute the profit and loss from a stock of 1000 black-faced breeding ewes, in Inverness-shire:—

126 ewes, at 9*l.* per score of 21	£54	0*s.*
105 shot lambs, at 2*l.* 10*s.* per score of 21	12	10
252 Wedder lambs, at 6*l.* per score of 21	72	0
180 stones of laid wool, at 5*s.* per stone	45	0
	183	10
DEDUCTIONS.		
Smearing	£25	
Two shepherds, meal, &c., besides pasturage	10	
Interest of money	35	
	70	0
Remaining for that and all public burdens	£113	10—p. 140.

This sum was considerably short of what was wanted for the landlord; and the only resource for the tenant, in order to enable him to make up the deficiency and keep his family, was the keep of a few cows, and the growth of potatoes, but which, after all, would yield a very unprofitable return for the time employed and the capital invested. The rent however is now lowered, and the price of wool considerably raised.

† On Breeding the Cheviot and Black-faced Sheep, by a Lammermuir Farmer, p. 77.

Hogg, "Cheviot rams were admitted to the hardy natives of the more elevated parts of the country. The independent habits of the mountain flocks were lost, and a mongrel progeny of a clumsy figure occupied the lowest and warmest of the pastures. Although both of the parents were hardy, the issue of the two were easily subdued by the cold of winter*."

The hire and wages of the shepherd are nearly the same in almost every part of Scotland. If he is a married man, he is allowed a house capable of being divided into two apartments, a little garden, extra ground for potatoes, grazing for one cow, or sometimes two, and also for a certain number of sheep, varying from eight to fifty or more, during the summer and winter, with their lambs to a certain time; and in addition to this a certain quantity of oats, and barley and peas for the subsistence of his family. Single men live in the farmer's house, and in addition to their subsistence have wages varying usually from 11*l.* to 16*l.* per annum, and pasture for their sheep. Usually twenty, and sometimes, but injudiciously, forty scores of sheep are placed under his care.

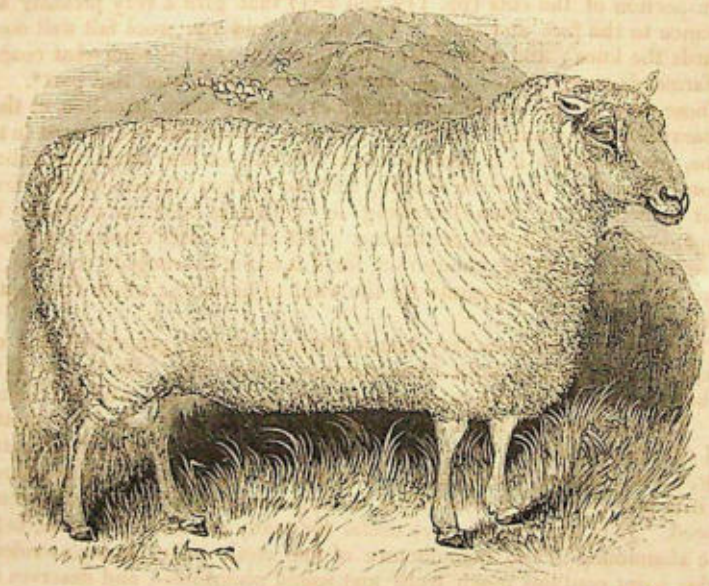
This mode of payment much resembles that adopted in the patriarchal times, and it is founded on excellent policy, for the interest of the servant is combined with that of the master. On extensive sheep-farms several shepherds must be employed, each having not only his master's sheep to watch and attend to, but some of his own, and probably of those belonging to his fellow-servants; thus they are bound together by a common bond of interest, and are all anxious that justice should be done to the flock. †

This will be better discussed when the Cheviots have been described.

* Quarterly Journ. of Agricul., i. 175.

† Kennedy and Grainger on Tenancy, p. 89.—If there is one work which more than another ought to find a place in the library of every hill sheep-farmer, it is "Little's Practical Observations on Mountain Sheep." An abstract of his account of the qualifications of a mountain-shepherd will be, to a certain extent, useful to the shepherd everywhere. "The shepherd should be honest, active, careful, and, above all, calm-tempered. A shepherd who at any time gets into a passion with his sheep, not only occasionally injures them, but acts at great disadvantage both in herding them and working among them. A good-tempered man and a close-mouthed dog will effect the desired object with half the time and trouble that it gives to the hasty passionate man." This is a golden rule, and cannot be too frequently and strenuously enforced. "The qualification of a shepherd is not to train his dog to running and hounding, but to direct the sheep according to the nature of the soil, and the climate, and the situation of the farm, in such a manner as to obtain the greatest quantity of safe and nutritious food at all seasons of the year." This precept deserves to be written in letters of gold. "It is not by walking much, or seeming to be doing much, that a shepherd proves himself to be a good one; but by walking so as to disturb the sheep the least, and by doing, and at the time, whatever is necessary to be done. There is not an experienced shepherd who does not as soon as he rises in the morning, and observes the state of the weather, know almost to a certainty where to find every sheep on the hill, and he will accordingly take his course to the place where he knows his presence is most wanted. If any of his own or his neighbour's sheep have trespassed, it is foolish to dog or to abuse them; but the more quietly they can be turned back the better. If the boundary should be on the top or ridge of a height, towards which sheep are apt to draw at night, it is better to turn his own a little closer to the boundary in the afternoon, than to drive back his neighbour's; it will better answer the same purpose; and after the flocks have been a few times gently divided in the morning, without dogs, they will become so well acquainted with their own side, that at the very sight of the shepherd they will take to it without trouble. Those shepherds who dog and force their flocks, I take to be bad herdsmen for their masters, and bad herdsmen for the neighbouring farmers. If the boundary be a bourn or brook on low ground, where the sheep graze in the middle of the day, the same plan should be adopted by turning the sheep down tolerably early in the day."—P. 79. The abstract shall not be continued farther, for the reader will be disposed to look for the continuation of it in the work itself.

THE CHEVIOT SHEEP.



The Cheviot Ram.

The Cheviot Hills are a part of that extensive and elevated range which extends from Galloway through Northumberland into Cumberland and Westmoreland, occupying a space of from 150 to 200 square miles. The majority of them are pointed like cones; their sides are smooth and steep, and their bases are nearly in contact with each other. The soil, except on the very top, is fertile; and from the base to the summit of most of them there is an unbroken and rich greensward.

On the upper part of that hill in Northumberland, which is properly termed *the Cheviot*, a peculiar and most valuable breed of sheep is found. They have been there almost from time immemorial. Tradition says that they came from the border districts of Scotland; but they are totally different from the black-faced sheep, and bear little or no resemblance to the original dun-faced Scottish stock. How two breeds, so totally different from each other, came to inhabit the neighbouring districts of Ettrick forest and the Cheviot hills, neither history nor tradition has attempted to explain*.

The Lammermuir farmer, an ardent admirer of them, says, that they are hornless; the face and legs generally white; the eye lively and prominent; the countenance open and pleasing; the ear large, and with a long space from the ear to the eye; the body long, and hence they are called "long sheep," in distinction from the black-faced breed. They are full behind the shoulder, they have a long straight back, they are round in the rib, and well proportioned in their quarters; the legs are clean and small-boned, and the pelt is thin, but thickly covered with fine short wool. The wool extends over the whole of the body, and comes forward behind the

* Farmer's Mag., Feb. 1824.

ear, but leaves the face uncovered—a circumstance, as will be evident from an inspection of the cuts (pp. 112 and 284) that give a very pleasing appearance to the face and head. The muscle and the wool fall well down towards the knee; and although on the thigh the wool is somewhat coarse, the farmer is compensated by the abundant growth of it on that part*.

Those who are accustomed to the Cheviots pay much attention to their appearance when young. The eyes and ears are carefully examined in the lambs, and if there is a redness about the one or the other, the animal is considered not to be in health, and he seldom shakes off the fever under which he is then labouring in sufficient time to overtake his companions in growth and endurance. The coat is also closely examined, and especially that of the young ram, for if it is not thoroughly compact, no beauty of form can compensate for the want of hardiness which this clearly indicates.

The Cheviot possesses very considerable fattening properties, and can endure much hardship both from starvation and cold. He is now fit for the butcher at three years, and at two years when crossed with the Leicester. The wethers average from 12 to 18 lbs. per quarter, and the mutton is of excellent quality. They have been exhibited at the Highland cattle-show, 30 and 32 lbs. per quarter. The wool is inferior to the South Down, and it is not so fine as it was before the improvement of the carcase commenced. It is longer and more useful for many combing purposes, but is quite abandoned in the manufacture of fine cloth. Mr. Varley's evidence on this point contains much truth and sound philosophy, and deserves the serious consideration not only of the Cheviot breeder, but of every sheep-master. "The Cheviot wool is deteriorated very much in point of hair, and will not make fine cloths now as it once would. I went into Scotland on purpose to inspect the Cheviot wool, and I gave it up in consequence of its being so much altered. It is coarser and longer, and although fit for combing, yet only to make low coatings and flushings. I allude to the Cheviot which has a partial cross of the Leicester. As sheep increase in weight, the wool will necessarily do so; it becomes longer in the hair and coarser†." It follows as a matter of necessity that if, as Mr. Sutcliffe states, the grazier "can now get as much weight in sixteen months in the Cheviot and Leicester cross, as he could in a three-year old wether in former times," that the wool must necessarily undergo a corresponding change‡.

Sir John Sinclair's description of them in 1792, and before they were thus changed by the admixture of the Leicester, is too valuable to be omitted even in this rapid sketch of the history of the Cheviots. It is here given in a somewhat condensed form:—"Perhaps there is no part of the whole island where, at first sight, a fine woolled breed of sheep is less to be expected than among the Cheviot hills. Many parts of the sheep-walks consist of nothing but peat bogs and deep morasses. During winter the hills are covered with snow for two, three, and sometimes four months, and they have an ample proportion of bad weather during the other seasons of the year, and yet a sheep is to be found that will thrive even in the wildest part of it. Their shape is excellent, and their fore-quarter in particular is distinguished by such justness of proportion, as to be equal in weight to the hind one. Their limbs are of a length to fit them for travelling, and

* On breeding the Cheviot, &c. p. 71.
† Evidence before the House of Lords, in 1828, p. 156.
‡ Ditto, p. 183.

part of what is at present *entirely* occupied by the native Highland. But the most experienced agree that on the wildest of the Grampian pastures no other stock can exist but the black-faced mountain sheep."

The contest is still carried on between these valuable breeds, but decidedly in favour of the Cheviots. With every improvement in agriculture they advance. From simple cold their fine and close coat protects them perhaps more effectually than the coarser and looser one of the black-faced; they may not be quite so patient endurers of hunger, but even on scanty fare they will thrive as well as their rivals—on average or somewhat superior pasture they will leave them far behind; and the time will probably arrive when, with the exception of a few and not very extensive districts, it will be acknowledged to be the only breed worthy of the Highlands of Scotland*.

This may not be an improper place to describe those dreadful storms which so often put to the test the hardiness of both these breeds, and under which they occasionally both succumb. The poet of Ettrick has given a most interesting account of them in his "Shepherd's Calendar†."

He first describes "The Thirteen Drifty Days," some time about the middle of the seventeenth century. "For thirteen days and nights the snow drift never once abated: the ground was covered with frozen snow when it commenced, and during all the time of its continuance the sheep never broke their fast. The cold was intense to a degree never before remembered, and about the fifth and sixth days of the storm, the young sheep began to fall into a sleepy and torpid state, and all that were so affected in the evening, died in the night. About the ninth and tenth days

* The following tables—the first supplied by Mr. Laidlaw, and the second by Messrs. Kennedy and Grainger—will place the relative value of the fleece and the carcase of the Cheviot and the black-faced sheep in a satisfactory point of view:—

The price of Cheviot Wool and Sheep in Selkirk from 1821 to 1831, inclusive.												The price of Black-faced Sheep in Lanarkshire.		
	Cheviot Wool, per stone of 24 lbs. English, smeared with tar.	Cheviot Wool, per stone of 24 lbs. Engl. smeared with turpentine, &c.	Cheviot Wool, per stone of 24 lbs. Engl. white or unsmeared.	Stock Wether Hogs, unclipped.	Stock Ewe Hogs, unclipped.	Ewe Hogs sold at market.	Tup Wether Lambs.	Second Ewe and Wether Lambs.	Draft Ewes.	Wethers unclipped.	Wethers for turnip feeding.	Ewes.	Lambs.	Black-faced wool, per stone of 24 lbs. Engl. smeared with Tar, &c.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1821	10 6	..	..	..	..	..	5 6	4 6	12 0	18 6	..	10 0	5 6	9 0
1822	11 0	..	..	..	10 0	..	5 6	4 6	10 0	..	15 0	8 6	5 6	5 4
1823	9 6	18 0	21 0	12 0	..	..	5 6	4 0	9 6	..	18 0	8 9	5 8	5 6
1824	12 0	18 0	22 0	13 6	..	12 6	5 9	4 0	14 0	22 0	23 6	10 6	5 10	6 6
1825	19 6	25 0	28 0	19 0	..	18 0	10 6	8 3	21 0	30 6	30 0	13 0	9 0	10 0
1826	10 0	13 0	15 6	12 6	15 0	..	5 3	3 9	10 3	19 0	18 0	11 0	5 8	5 6
1827	10 6	14 6	16 6	12 6	15 6	..	7 0	5 9	14 6	18 6	23 6	12 0	7 3	5 6
1828	8 3	13 0	16 0	15 0	..	14 0	8 0	7 0	14 6	22 0	23 6	12 6	7 6	5 6
1829	7 9	10 9	14 0	12 6	14 6	11 6	7 0	5 9	14 6	21 0	20 0	..	..	..
1830	10 6	14 0	16 6	10 6	11 6	9 0	5 0	3 9	9 6	17 0	17 0	..	..	..
1831	16 6	20 0	24 6	13 6	14 6	10 6	7 0	5 6	14 9	21 0	21 0	..	..	..

† Vol. II., p. 254.

the shepherds began to build up huge semi-circular walls of their dead, in order to afford some shelter to the remainder; but shelter availed little, for the want of food began to be felt so severely that they were frequently seen tearing one another's wool.

"When the storm abated on the fourteenth day, there was on many a high-lying farm not a living sheep to be seen. Large misshapen walls of dead, surrounding a small prostrate flock, likewise all dead and frozen stiff in their layers, were all that remained to the forlorn shepherd and his master. In the extensive pastoral district of Eskdale-muir, which previously contained more than 20,000 sheep, only forty young wethers were left on one farm, and five old ewes on another. The farm of Phants remained without stock and without a tenant for forty years after the storm; and an extensive glen in Tweedsmuir became a common to which any man drove his flocks that pleased, and so it continued for nearly a century."

The winters of 1772 and 1795 were also remarkable for their severity; by them all the subsequent hard winters have been estimated, and when the balance turns out in favour of the calculator, he is thankful. No apology is made for the insertion of the following picture:—"I know of no scene so impressive as that of a shepherd's family, sequestered in a lone glen during the time of a winter-storm. There they are left to the protection of Heaven alone, and they know and feel it. Before retiring to rest the shepherd uniformly goes out to examine the state of the weather, and make his report to the little dependent group within. Nothing is to be seen but the conflict of the elements, nor heard but the raving of the storm. Then they all kneel around him while he recommends them to the protection of Heaven; and though their little hymn of praise can scarcely be heard even by themselves, and mixes with the roar of the tempest, they never fail to rise from their devotions with their spirits cheered, and their confidence renewed. Often have I been a sharer in such scenes, and never in my youngest years without having my heart deeply impressed. We lived, as it were, inmates of the cloud and the storm, but we stood in relationship to Him who directed and governed them."

The sheep have generally an unerring foresight of the approach of these storms, or rather of the coming wind which will drift; and they will hurry away to some tried and approved shelter, when the shepherd sees not a cloud, and dreams not of the wind. "I had left," says one of these Alpine shepherds, "my sheep under their accustomed shelter, and where I had never missed to find them safe and comfortable in the morning, and I was plodding my weary way homeward; but before distance and darkness closed them from my sight for the night, I looked back to see if they had *given over work*, (ceased to dig for their food, for there was snow upon the ground,) when I was surprised to see them on their march down hill towards a small plantation which would afford securer shelter, and to which I had been accustomed to drive them when I feared the coming tempest. They had fallen into rows, pacing one after the other until they reached the plantation, and there was nothing to suggest to my mind the return of a drift, but their movement and their bleating. They passed through the plantation, and took that side of it which would afford them a safe shelter from the south-west hurricanes. It however happened, that, although their instinct had admonished them that a tempest was impending, it had not taught them from what quarter that tempest would come, and it soon began to blow from the north-east, from which they had no defence. When I came to them in the morning, the wreath was higher than the dyke, and was leaning over upon the trees. Some of the strongest sheep had still

kept treading down the snow as it gathered around them, and were on the top of the wreath; but many of them farther back were quite immersed in the snow. However, by means of probing and digging, I got them all out, except two hogs that had been crushed by the weight of the snow, and their comrades struggling above them*."

Sometimes the storm overtakes the flock at a distance from any shelter, and they crowd together, or are driven together by the shepherd, in the vain hope of protecting and warming each other: but, very shortly, some of the lambs are overwhelmed; and the mothers, as if to augment the confusion, lose all maternal instinctive sense, and are no longer able to recognize their own offspring, but run about bleating in wild amazement, or stop to smell at the various spots under which lie the victims of the blast, or where the plaintive cry of the little struggler may perhaps still be heard. All this wild agitation of the mothers aggravates the evil to a dreadful degree; and a scene of confusion and misery ensues which will scarcely ever be forgotten by him who has witnessed it. It is better for the mother and her lamb when she is separated a little from the flock; she will then quietly lay herself down, opposing herself to the blast, and while life remains to her she will continue to shelter her offspring with her own body†.

The time which the sheep survives when thus buried in the snow, depends on the natural strength and endurance of the animal, the degree of cold, and the possibility of obtaining a little portion of food. A sheep near Kendal was, in the winter of 1800, buried in the snow thirty-three days and nights, without the possibility of moving, and yet survived‡. In the same winter, a sheep near Caldbeck, in Cumberland, was buried thirty-eight days; when found it had completely eaten the wool off both its shoulders, and was reduced to a skeleton. It, nevertheless, perfectly recovered§. It is seldom, however, that one cold night is not fatal to some of the weakly ewes or lambs.

The Hon. W. J. Napier has published a very interesting work on mountain store-farming, in which he enters into many calculations respecting the loss sustained by the sheep-farmer from the occurrence of these storms. Reckoning from 1672 to 1822, a period of 150 years, he shows that there have been twenty-five bad seasons, or one in every sixth year, and several of them attended with an immense loss of sheep‖. He has calculated the

* Farmer's Magazine, Feb. 1824.

‡ Edinburgh Farmer's Magazine, Feb. 1824.

† Annual Register, 1808.

§ Agricul. Magazine, Feb. 1808.

‖ "Of all the storms that ever Scotland witnessed, or I hope will again behold, there is none of them that can be compared to that of the night between the 24th and 25th of January, 1794. This storm fell with peculiar violence on that division of the south of Scotland that lies between Crawford-muir and the Border. In these bounds seventeen shepherds perished, and upwards of thirty were carried home insensible, who afterwards recovered. The number of sheep that were lost outwent any possibility of calculation. One farmer alone lost seventy-two scores, and many others in the same quarter from thirty to forty scores each. Whole flocks were overwhelmed with snow, and no one ever knew where they were until the snow dissolved, and they were all found dead. I myself witnessed one particular instance of this. There were twelve scores of excellent ewes, all of one age, that were missing all the time that the snow lay, which was only a week, and no traces of them could be found. When the snow went away they were discovered all lying dead with their heads one way, as if a flock of sheep had dropped dead going from the washing. Many hundreds were driven into waters, bourns, and lakes, by the violence of the storm, where they were buried or frozen up, and these the flood carried away, so that they were never seen by the owners at all. The greater part of the rivers on which the storm was most deadly, run into the Solway Frith, on which there is a place called the Beds of Esk, where the tide throws out and leaves

average of these losses, or their excess above the usual ordinary losses; and, relying on the authority of an experienced sheepmaster, Mr. Laidlaw, he concludes that it is at least 50*l.* a-year above the usual loss in every farm containing 1000 head of sheep*.

On seriously considering the matter, he felt convinced that a very great portion of these losses might have been easily averted by attention to food and to shelter. He adopted a better smearing process for his sheep. It is not possible to maintain the health and vigour of sheep exposed to the vicissitudes of the weather in these mountainous regions, without the application of a certain composition to the fleece, usually consisting of tar and butter—the tar destroying the insects and diseases of the skin to which sheep are subject in exposed situations, and also matting together the wool and rendering it impervious to cold or wet, and the butter likewise assisting in making the fleece water-proof, and nourishing the growth of the wool. Mr. Napier adopted a somewhat preferable application, consisting of spirits of tar and whale oil. He drained some portions of his farm, where the soft and washy grass, he thought, produced weakness in the sheep, and disabled them from struggling with the severity of the situation and climate. He enclosed a park for the preservation of his hay, and he built in the most exposed situations a few circular *stells*, or rudely constructed covered buildings, yielding sufficient shelter, and supplied with hay. The consequence was, that although in 1818-19 he lost fifty-five sheep, besides a great number of lambs, in the following year he lost but thirty; in the next nineteen, and in the next thirteen, being a most satisfactory return for the expenditure of about 100*l.* for park drains and stells. In addition to this the whole flock was more healthy, and the usual summer loss materially diminished†.

It is scarcely twenty years ago that these simple yet effectual contrivances for the safety of the sheep and the shepherd, and the profit of the farmer,

whatever is carried into it by the rivers. When the flood, after the storm, subsided, there were found in that place and the shores adjacent, 1840 sheep, 9 black cattle, 3 horses, 2 men, 1 woman, 45 dogs, and 180 hares, besides a number of meaner animals."—Hogg's Shepherd's Calendar, Vol. II., p. 360.

* Napier's Treatise on Practical Store-farming, p. 44.

† These stells should be substantially built, and which may be done at comparatively little expense. The public are much indebted to the Hon. Captain Napier for putting this matter in an unanswerable point of view. He calculates—and he enters into all the particulars—that each circular stell would cost 39*s.*—that each would, closely packed, accommodate seventy-five sheep, being thirty feet in diameter inside; and that, consequently, the stells would hold 1014 sheep, and the cost of these fourteen stells would be 27*l.* 6*s.* In case, however, of sudden storms, and the sheep being scattered wide, he recommends that the stells should be more thickly placed, and that twenty-four should be erected, at an expense of 64*l.* 16*s.*, or an interest of little more than 3*l.* per annum. In nearly average severity, it has already been seen that the saving to the farmer, by means of the protection afforded to the sheep, would shortly repay the principal. He had the opportunity however of showing, on the authority of Mr. Laidlaw, the difference to the farmer in years of more than usual severity. There were two farms on Ettrick, Bowerhope and Crosseleugh. Bowerhope was provided with stells, and Crosseleugh had none. The winters of 1816 and 1818 were very destructive to sheep. The extra loss of sheep and lambs on Crosseleugh was 400 lambs, and 70 old sheep, amounting in value to 230*l.* That on Bowerhope amounted to 120 lambs, and 18 old sheep, worth 66*l.*, leaving 164*l.* saved by the stells. But Bowerhope kept at least one-third more sheep than Crosseleugh, and therefore the saving was considerably more than 200*l.* Had this its proper effect on the sheep-farmers? Did they become wiser from experience? No! "They consoled themselves," says Mr. Laidlaw, "with repining at the bad seasons, and they trust merely to better times, and to the landlord's generosity, to save them from impending ruin."—Napier's Practical Store-farming, p. 126; and Farmer's Magazine, Nov. 1822.

began to be adopted on the mountain sheep-farms, and they are far from being so well known, or so extensively used as they deserve to be. "At the commencement of the fall," says Mr. Napier, "the sheep accustomed to the stells would naturally draw forward and reach them with little exertion, and there they would remain in safety, satisfied with the hay with which the stell is stored. When the sleet and snow drive fiercely down the glens, they seek for shelter in the stell; but, the blast gone by, they return to their labour among the snow; and so much do they prefer the half-green grass to the best hay that can be provided, that they persevere in working through the snow to get at it as long as they feel themselves proof against the cold, and it may be left to their own choice whether to work without, or to find their sustenance within; and they will be seen many times in the day passing and repassing, according to the change or the prevalence of the blast. Instinct will teach them when to fly for shelter, and when to return to the pasture; and at the same time the shepherd may be with them rejoicing in the consciousness of his own safety as well as theirs."

Let this be compared with the account which the Ettrick Shepherd has given of a snow-storm to which he was exposed. The storm had raged during the whole of the night. He and his fellow-servants and his master rose two hours before day, for they had a lot of 800 ewes a long way distant, and they were resolved to make a bold effort to reach them. The enclosure or park round the house was not more than 300 yards, but the snow was so deep and drifting, and the wind so violent, that it was full two hours before they had cleared the enclosure. It was two hours more before they reached the sheep.

The ewes were standing in a close body, one-half of them covered over with snow to the depth of ten feet. They were got out safe; but there were a hundred more in another place near by, of which few alone could be saved before the night closed upon them. There were still 340 under the immediate care of Hogg, but nothing could be done for them until the following dawn, when they all set out again to look after them. They passed by a deep glen full of trees; there was not the top of one of them to be seen. They came to the ground were the sheep should have been, but there was not one of them above the snow. Here and there they could perceive the heads or horns of stragglers appearing, and these were easily got out; but when they had collected these few, they could find no more. It was a kind of sloping ground, and the snow was from six to eight feet deep, and under this the sheep were lying, scattered over at least 100 acres of heathy ground. They went about boring with their long poles, but they often did not find one sheep in a quarter of an hour. At length a white shaggy colly (sheep-dog), named Sparkie, seemed to have comprehended their perplexity, for he began to scrape the snow, and look over his shoulder at them. On going to the spot they found that he had marked right over a sheep. From that he flew to another, and then to another, as fast as they could get them out, and ten times faster, for he had sometimes twenty or thirty holes marked beforehand.

They got out 300 of that division before night, the greater part of which would have been lost had it not been for Sparkie; and before the snow went away, which lay eight days, they got out every sheep on the farm, either dead or alive, except four, and that these were not found was not Sparkie's fault, for though they were buried beneath a mountain of snow fifty feet deep, he had again and again marked on the top of it above them. The sheep were all living when they were found; but those that were buried in the snow to a certain depth, being in a warm, half-suffocated

state, though on being taken out they bounded away like roes, were instantly afterwards paralysed by the sudden change of temperature, and fell down deprived of all power of their limbs. They were carried home and fed with the hand, and many of them recovered; but those that had been buried very deep all died. "We lost about sixty in all," says Mr. Hogg, "and I am certain that Sparkie saved at least 200; but there were thousands of sheep lost in the neighbourhood, and several of the shepherds perished in the snow*."

Various crosses of the Cheviots with other breeds have been attempted. One of the earliest of southern blood that was tried was with the South Down. It has been stated, when speaking of this valuable breed of sheep, that they have rarely done well in the north. There are exceptions to this; and a very striking one at the present moment exists on the Sidlaw part of the Grampians at Keillor. Mr. Hugh Watson has a flock of 1000 pure South Downs, which he has carefully preserved for the last twenty years, and which are now quite naturalized to the climate, and as healthy as any stock in the kingdom.

After selecting the number necessary to keep up the pure stock, he annually puts the old ewes to pure-bred Leicester rams, and these produce a cross of the most valuable description, both for wool and carcase. The wool at present is worth 2*s.* per lb.; and the carcase, after clipping (the sheep being well fed on turnips during the winter), will make from 30*s.* to 35*s.*; or on an average of the last five years, the sheep, when fifteen months old, have produced 42*s.* each. This speaks much in favour of that system of breeding which has been so often recommended to the attention of the British sheep-farmer, namely, to look more to the improvement of the carcase, and to be satisfied with that wool, which, although longer and coarser, is adapted for many useful purposes, and yields a fair remunerating price.

The cross of the Cheviot with the South Down has not been successful. Messrs. Kennedy and Grainger state that, early in the present century, an attempt was made to improve the quality of the Cheviot wool by crossing a considerable number of the best ewes that could be selected from the flocks of the principal sheep-farmers with two South Down rams, purchased at a very high price from Mr. Ellman of Glynde. The experiment was pursued during several successive years, but totally failed; the produce not having sufficient hardiness to endure the severity to which the Cheviots are usually exposed.

At a later period, the experiment was repeated in the county of Sutherland. A South Down ram, very carefully selected, was put to a number of Cheviot ewes, with rather coarser wool than usual. This was continued five or six years, the seasons being favourable, and it began to be imagined that a cross breed of considerable value had been established; but in the winter and spring of 1816, came a frost—a killing frost—and not one of the mixed-blood was left alive upon the farm.

The Cheviots have also been crossed with the Leicesters, and this repeated again and again until there was comparatively none of the Cheviot blood remaining. The result of these crosses—whether attempted in a slight degree, or carried to their full extent—will be best considered when the long-woolled sheep are described.

On surveying the whole of Scotland with reference to the mountain-sheep, the breeding is mostly pursued in the southern parts, and the rearing of wethers in the northern districts. The ewes and their lambs will fare well in the former, and the wethers can find a subsistence in the latter. In first procuring a stock, the farmer should be anxious to obtain it, if pos-

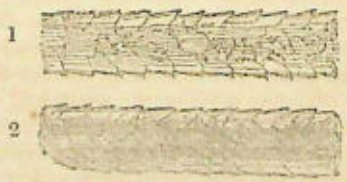
* Hogg's Shepherd's Calendar, vol. ii., p. 266.

sible, from a poorer and more exposed situation, rather than from a more fertile and sheltered one. The sheep will be satisfied, and thrive in the former case; but will often be discontented and wandering, and will lose condition in the latter. If the time of selection is at the option of the farmer, it should be when his pastures are most thickly covered with grass, and, for the same reason, that the sheep may be better disposed to settle on their new situation. On the same account, the land should not be at first too heavily stocked; and the lambing time should be somewhat later, that the ewes and the lambs may be in better condition. The lambs, when castrated, should be used gently, and kept clean, and never dogged.

The time for shearing, in a mountain-farm, is of considerable importance, and will vary with the breed and the situation. It should be when the new wool has risen from the skin, and the old wool is beginning to be detached,—when that which had been a defence and a comfort during the winter is becoming a burden. The general fault is that the wool, and particularly that of the wethers, is kept on too long.

The following cuts of the microscopic appearance of the Cheviot wool contain an accurate delineation of two samples kindly forwarded by Mr. Adam, of Beaufort, Invernessshire.

I. *The Cheviot—Hill Fed.*



This fibre of wool is from a hill-fed Cheviot. The pasture was considerably exposed to the west wind, but the sheep had turnips during the last winter. The fibre was 7½ inches in length; the diameter as nearly as possible that of the Leicester, $\frac{1}{500}$th part of an inch.

1. It is viewed as a transparent object: the number of serrations are 1860 to the inch—precisely the number found on a fibre of Leicester wool; they are tolerably distinct, and sharp, although not very projecting.

2. Viewed as a transparent object, the pointed tips of the leaves composing the cups are very striking. There is a great resemblance to the Leicester; and the derivation of the breed is well illustrated by the formation of the fibre.

II. *The Cheviot—Good Pasture.*



The fibre here drawn is from a two-year old Cheviot about to be sent to the market, and that had always been kept on excellent pasture.

1. The fibre observed as a transparent object, was 9 inches in length, and its diameter a very little larger than that of No. 1. There is a marked difference in the number of the serrations: there are but nine in the field of view, or 1440 in the space of an inch. The serrations vary considerably in their projection: some of them form nearly a right angle, some more than this, and others less.

2. It is here seen as a transparent object. The first notion that presents itself to the mind is the likeness of the fibre to a glass tube filled with broken spar; but on closely, or rather painfully, inspecting it, the pointed leaves forming the cups are detected. Some principle has been at work to disturb the usual formation and growth of the fibre.

Nothing can be more satisfactory in showing the influence of food on the growth and character of the fleece, as well as on the developement of the frame generally. The length, the structure, and the uses of the wool are materially injured by this mountain-sheep being taken from the locality which nature assigned to him. There is much to learn on this point of sheep-husbandry, and the change which is now taking place in the fleece of the sheep will render this knowledge of incalculable value.

The time of weaning deserves consideration. It is dependent on the nature of the pasture, and somewhat also on the time at which the neighbouring fairs or markets are held. It should scarcely be before the middle of July, and it should be completed before the end of the following month. The practice of milking the ewes after weaning is getting into disrepute, and will, in process of time, be quite abandoned.

Later in the autumn comes the drafting of the old stock. The custom of keeping the ewes as long as they are likely to bring lambs is too generally adopted, to the manifest detriment of the value of the flock, both as it regards the wool and the flesh. A ewe should rarely be kept after she is five and a-half years old. She will, at that age, or earlier than become more rapidly fit for the butcher, and there will be no dan degeneracy to the flock.

The question of smearing, and the best composition for this pu will be more fully considered when the skin of the sheep is des Laid, or unsmeared, wool bears a considerably higher price than which is smeared; but the additional profit on the fleece would be de acquired at the loss of many a valuable sheep, and the miserable wan condition of the whole flock. Different breeds possess different degrees hardihood; but there is no breed that would not cease to thrive and rapidly fall away if abandoned to the severity of some of the highland districts.

The time of taking the tups to the ewes, and consequently the period of lambing, must depend on the situation and character of the farm; but there is one rule applicable to mountain sheep-farming everywhere,—namely, that, all other things being alike, it is much better, both for the mother and the offspring, to have the lambing time a little too late than a little too early. The inclemency of the weather will be more likely to be passed—the ewes will be a little recovered from the trials of the winter—the lambs will have less to contend with—and the ewes themselves, comfortable and in good condition, will be more kindly to their lambs, and more careful about them. The tups, however, should not remain too long with the ewes, otherwise the ewes will be injured for the ensuing season. The average time for lambing in one of these farms would probably be from the middle to the end of April *.

Among the improvements in mountain sheep-farming may be reckoned the introduction of inclosures, where they can be made at small expense. The sheep are sheltered; the lives of many are saved during the winter; and the grass is uniformly earlier, better, and greater in quantity. Draining, while it has increased the quantity and the quality of the grass, and afforded a dryer and more comfortable bed for the stock, has most materially lessened the ravages of the rot, and improved the general health and thriving of the flock. The erection of wide and simple bridges over which sheep may pass, when, in the night-time, or during a storm, they will travel from one side of the brook to the other, has saved many a life. The habit of burning the moss and heath on various parts of the

* Little on Mountain Sheep, p. 51.

farms has produced more and better food for the sheep. Mr. Laidlaw, whose authority will be admitted by every practical man, said, when he was keeping about 2000 sheep, that he would rather lose 50*l.* than one year's burning. This deserves the consideration of those who suffer so much land to be comparatively barren and unprofitable, for the sake of affording shelter to their moor-fowl*; and yet even the moor-fowl would be benefited by the heath being occasionally burnt, providing it be not done during the breeding season. The best broods are always found in heath of a moderate growth.

The introduction of top-dressing, or surface lining, has had admirable effect, and also the more general adoption of that which, fifty years ago, was almost unknown—the providing of food against the necessities of a stormy winter. Mr. Little proposes a cheap and admirable plan of collecting a certain portion, at least, of winter's food, namely,—"To begin early in the season, when every kind of herbage on common sheep-pasture is green and full of sap, to mow all kinds of roughnesses, as heath, ling, bent, and ferns, that will cut with the scythe, and make them into hay. Mowing would be the greatest expense, and could easily be performed by the shepherds; the grass would require very little drying, on account of the great quantity of dry stuff cut along with it, and might be set up in low ricks in the places where it is made. These, on an average of two years out of three, would, along with their ordinary pasture, be sufficient for the support of the sheep†."

One other suggestion from this excellent writer is quoted,—namely, the letting the ewes, the gimmers, and the hogs, go at large on the same pasture. The land is more equally pastured—there is no trouble or danger in shifting—the hogs, in time of storm, are better led in search of food along with the old sheep than by themselves; being continued in the place where they were lambed, they are not so apt to stray from the farm—the shepherds are not at so great a loss in looking over the hill or sheep-walk in storms and in lambing-time, and the healthiest and the strongest sheep can go to situations where the more weakly cannot, and are more easily discovered in selecting a breeding stock. Those that pasture on the higher and bleaker parts of a farm, and are accustomed to bear cold, hunger, and fatigue better than if bred on a lower part, whenever they are driven from the high land by a storm, return to it again as soon as the weather brightens: the flock is divided into two lots, and the different breeding and the different hardihood of the two divisions are unerringly marked‡.

THE ISLANDS OF SCOTLAND.

The sheep on the different islands on the coast of Scotland are chiefly of the native breed, but somewhat differing in colour and size.

ARRAN

was formerly devoted almost exclusively to the breeding of cattle, but there now are many sheep-walks in various parts of it. The black-faced sheep was introduced from Argyleshire about thirty years ago, and has answered exceedingly well; but the greater number are still of the ancient native breed, distinguished by their dun or yellow faces and legs, and the fine flavour of their mutton. They do not weigh more than 7 or 8 lbs. per quarter.

* Little on Mountain Sheep, p. 20. † Ibid. p. 47.
‡ Ibid. p. 88.

ISLAY.

the greater part of which belongs to Mr. Walter Frederick Campbell, contains about 4000 sheep, principally of the black-faced breed. These sheep are too much neglected, and the wool is even coarser than that of flocks of the same breed on the mainland: but if they were removed from the ground which they now occupy, the island would be fit for nothing but shooting and deer-stalking. Mr. Campbell calculates that the wool—about 4 lbs. to the fleece—pays the rent of his tenant, and the carcase is placed against the expense of management. The ewes are sometimes clipped four times in the year, and the wethers seldom less than twice.

JURA.

The cattle have nearly disappeared from this island, and it has become one large sheep-walk. The breed is the same as in Islay.

THE HEBRIDES.

The original breed is very small, with white faces and horns, and bearing considerable likeness to some of the Shetlanders. The general colour is white, but there are individuals of all colours—black, brown, and grey. They are active and handsome. The black-faced breed has been lately introduced; and being of a larger size, yet not too large for the pasture, they answer well. They are not, however, quite naturalized, for they are often subject to diseases from which the natives are exempt. The sheep in the Hebrides are principally kept on account of their wool, a great part of which is used in the rude manufactures of the inhabitants. The women spin the wool, and dye the yarn, and in almost every family the articles of clothing are made within doors; a small supply only of calico, handkerchiefs, and hats, is obtained from Glasgow. The Hebridean woollen stuffs are coarse enough, but they are well adapted to the climate *.

THE ORKNEY ISLANDS.

The accounts given of the sheep of these islands are exceedingly unsatisfactory. They are said to amount in the whole to at least 50,000, and they produce a very fine wool; but they are neglected to a degree which would scarcely be thought credible so near to a civilized country.

The number of the Orkney Islands is no less than sixty-eight, more than half of which are uninhabited, but they all yield some nutriment for cattle and sheep. These animals are turned at perfect liberty—the sheep being caught, or driven home, only once in every year, and the cattle, in many cases, not so frequently. Mr. Low, a good naturalist, and a pleasing writer, gives the following account of this annual meeting between the sheep and their owners:—"About midsummer there is a particular day published for *rowing;* when all the men in the parish, attended by their dogs, turn out and drive the whole flock, without any preparation of washing, into narrow pens, and thence, I may say, to the place of execution, where the wool is torn—not shorn—off their backs; an operation which brings the whole blood into their skin, and is not only disgusting, but, if the season proves harsh, is the cause of great destruction. But, however cruel this may seem, it is almost the only notice that is taken of these useful animals until the next crop of wool is ready to be plucked†." There is not, however, so much cruelty in this operation as might be

* Transactions of the Highland Society, vol. ii., p. 263.
† Fauna Orcadensis, p. 7.

imagined—or, rather, there is no cruelty at all—for the wool is at that time beginning to separate from the skin; it is removed without pain to the animal, and if it were not thus obtained a great portion of it would be lost.

The same writer gives no very favourable account of their flesh. "The mutton is here, in general, but ordinary, owing to the sheep feeding much on sea ware; to procure which these creatures show a wonderful sagacity, for no sooner has the tide of ebb begun to run, than they, although at a great distance, immediately betake themselves at full speed, one and all, to the shore, where they continue until the tide begins to flow, when they as regularly retire *."

THE SHETLAND ISLANDS

These islands are situated still farther northward, nearly half-way to the coast of Norway. They produce a sheep that has from the earliest period been celebrated for the unrivalled fineness of its wool. There can be no doubt that it was originally derived from Denmark, and was brought over by the first settlers in these islands, who were of Danish extraction; for the Shetland isles then acknowledged the Danish sway. Some of the Jutland sheep much resemble the Shetlanders in general form, but they cannot compete with them in the fineness of their wool.

The Shetland sheep are small, generally without horns, seldom weighing more than 9 or 10 lbs. per quarter, and frequently not more than 7 or 8 lbs. They are of two kinds: one of them—the native breed—produces the finest and softest wool; sometimes white, and of an unequalled brilliancy of colour; and on other sheep, of a grey, russet, or even black colour. From its peculiar softness, it is called the cottony wool.

The numbers of this breed are considerably diminished, for the Shetlanders were not content with the treasure which they possessed in this beautiful wool, but attempted to increase the size of the animal; and sheep of almost every breed were in their turn imported into these islands. A somewhat larger breed, but with an impaired fleece, was partially established on the coast; but it does not thrive there—it is unable to bear the rigour of a northern winter, and often perishes from absolute cold, or from the privations and austerity of the slow-coming and ungenial spring.

Many of the native breed, however, still remain. Possessed of great activity, and frequenting, in general, the more desolate wilds, and at the greatest distance from the abodes of men, they withdraw themselves from the others, and the breed is only partially debased by accidental stragglers. Mr. Johnson gives the following description of a ram of the pure breed:—"His skin, when the hair is parted, and his palate, and the bridge of his nose, and his horns, and his hoofs, should be white. His horns also, if he has any—but the hornless breed is the best—should be set wide at the roots. The body should be long, the legs short, the hoofs broad, the head narrow, and the countenance pleasant; the wool fine on almost every part of the sheep, and weighing from 1½ to 2 lbs., and worth, on the average, from 3*s.* to 4*s.* per lb. By the cross with the Dutch, and which used to be the prevailing one, the carcase is heavier; the wool coarser, and often even on the neck and shoulders; and the fleece weighing 4 lbs. or more, but not worth one-fourth so much per lb. The tail is about six inches long, and shaped like a flounder, whence arose their name—"the flounder-tailed sheep †."

There is, perhaps, no part of the world in which the breed, or the few

* Fauna Orcadensis, p. 9. † Survey of the Shetland Isles.

of it that are at present found, have remained, century after century, precisely in the same state. This admits of a ready explanation. The pure Shetland sheep deserves not the name of a domestic animal. He is scarcely seen more than once in the year, when he is hunted home in order to be pulled. Often he is scarcely seen even at that period, for he left his coat among the bushes, and is suffered to escape disregarded. He cannot, therefore, be improved by selection: nay, it seems determined that he shall not.

The ewes and lambs are driven home at the pulling time, not, indeed, without difficulty, but few of them that retain their wool are eventually missing; the rams, however, are apt to wander far away to other flocks, and one or more of them are frequently found wanting at the time of reckoning, and are occasionally lost entirely. If, therefore, the sheep-owner observes a ram-lamb in his flock that yields more than the average quantity of wool, or wool of unusual fineness and value, he does not devote him to the purpose of improving his flock—he cannot do so in the way his sheep are managed—but he makes sure of his fleece for some succeeding years by castrating him. Well might Dr. Anderson say—"There is not upon record so striking an instance to be found of the powerful tendency of nature to preserve a breed, in spite of the efforts of art to destroy it, as this case affords *."

The superior and pure breed is called the *kindly* breed. They are most frequent in the small and otherwise uninhabited islands or *holmes*, and on the mountainous parts of the larger islands. The wool is nearly of the same quality all over them. In the debased breed there is often fine wool about the neck, but on other parts of the body it is comparatively coarse. In both breeds it is mixed and adulterated with hairs, resembling the ruminants of almost every cold climate, but the proportion of hair not being so great. A portion of that hair is of the nature of, and scarcely inferior to, the softest fur.

The process of shedding the coat resembles that which takes place in other ruminants, and, to a greater or less degree, in all other animals in cold countries. The wool begins to loosen at the roots towards the close of the winter, and gradually rises through and separates from the hair, and would be eventually detached and lost; but in order to prevent this the Shetlander, towards the end of March or the beginning of April, collects all his sheep together in *punds* and *crues*—folds of different construction—in order to pull away the wool. The common operation of shearing is out of the question here. The hairy coat would render it difficult or almost impossible to be accomplished. The wool is pulled through the hair; it is only the process of nature fully accomplished a little before its time, and that with little inconvenience and no pain to the sheep. It is the best, or, perhaps, the only method which could be adopted in order to obtain the fleece of these animals. The wool being thus detached, a great many hairs are found mingling with it, and which must be separated before the fleece is ready for the manufacturer. The animal is still covered by a thick coat of hair, forming a sufficient defence against the cold which in such a climate accompanies the early months of the spring.

The lambs are now examined, and a selection is made of those that are to be castrated, and, for the reason just mentioned, that the ram is apt to wander from the flock, the fleece of every kindly lamb is secured by making him a wether; while those that are spared for breeding wear the coarsest fleece and have the most unpromising form of any in the flock. Too many of these are left; for it frequently happens that in a Shetland

* Anderson on Sheep, p. 96.

flock there are not more than three ewes to a ram. Such a system is most injurious and absurd; yet most of the Shetland agriculturists obstinately adhere to it. The exceptions to this practice are, however, becoming more numerous; and, in process of time, the owner of the sheep will be better aware of his true interest.

The wool again beginning to grow, and having attained the length of about three inches, the hair in its turn drops off; but this is a slower process, and regulated by the growth of the new hair beneath. It is not altogether accomplished until the approach of winter, when a perfect double coat, one of wool and one of hair, again is formed upon the animal, being a wise and kind provision against the inclemency of such a winter as he is to endure.

When the wool is separated from the *fors*, or hairs with which it is mixed, it is peculiarly soft and fine. A portion of fur mingles with it, whether showing the near analogy between these productions, or being the rudiment of the future hair—the first form which it assumes. It is considerably used, and valued as a fur.

The Highland Society, in its report on the northern wool, states that "the exact nature, quality, and uses of the Shetland wool have never been fully ascertained. It is certainly preferable to any other for stockings, and probably for all light woollen manufactures, as shawls and waistcoats. Perhaps, mixed with Spanish wool, it might be employed in making broadcloth. There can be no doubt of its answering for hats, a manufacture that ought to be encouraged in the Highlands*."

Dr. Anderson gives a somewhat similar account of it:—"It is a very fine combing wool. It has a peculiar softness, and is much finer than any combing wool of the growth of this kingdom that I ever saw; but it is by no means equal to the Spanish wool, neither does it seem to be capable of being spun in any other manner than as worsted†. Even for the purpose of worsted yarn, there is so great a difference in the fineness and value of the fleece, that stockings have been manufactured from one sort, which sold at two guineas the pair, while those woven from the wool of other sheep would have been dear at sixpence‡."

The whole number of sheep, good and bad, which the Shetland Isles contain, are computed at about 115,000. The improvement of them was once deemed a national object. Their hardiness well fits them for the situation in which they are found. They are pleasing objects for the naturalist to study; but their size is so diminutive, and the uses of the fleece so limited, that they are scarcely deserving of more extended cultivation§.

In some of the smaller of this group of islands, there is, for such a climate, very fair herbage for these little sheep; and on the others, in the immediate neighbourhood of the coast, there is some green mossy pasture, to which the sheep resort during the greater part of the summer; but as the autumn approaches, they are compelled by the storms to betake themselves to the inland and hilly walks, where scarcely a blade of grass presents itself amidst the heath. This sudden and total change of pasture is trying to the native breed, and very destructive to the newly-imported sheep.

* Report on Highland Wool, p. 3.

† A Letter to the Bath Society on Wool, p. 25.

‡ Report on Highland Wool, p. 4.

§ An amusing and intelligent writer, speaking of the aboriginal and wilder sheep, says that "In the Shetland Islands there is a gull which defends the flock from eagles, and is therefore regarded as a privileged bird. Many inquiries have been made respecting this, but without any satisfactory answer."—*The Beauties, Harmonies, and Sublimities of Nature*, vol. iii. p. 34.

Nature, however, has not quite abandoned them. The storms which drive them from the pastures in the immediate vicinity of the coast, strew that coast with abundance of sea-weed; and the flocks, as in the Orkney Islands, by some instinctive impulse, or by the result of their own observation, knowing precisely the time of the ebb, rush from the hills, and hastily devour that which is thus provided for them. When the snow lies deep on the hills above, this is often the only food which they can obtain for many successive weeks. These periodical excursions, however, are attended with considerable danger: and many sheep, remaining to the last moment, in order to lay in provision for the long fast that is to succeed, and previously weakened by hunger and disease, are unable to climb again the precipitous rocks over which they had descended, and are swept away by the returning tide, or perish in the clefts and coves in which they had taken refuge.

ISLE OF MAN.

This island, although lying in the Irish Sea, and some hundred leagues from the Shetland group, will be most conveniently considered before the mainland is revisited. The sheep are small on the hills, seldom exceeding 8 or 10 lbs. the quarter, and producing a fleece of short or middle wool, weighing 2½ lbs. They bear much resemblance to the Welsh sheep, and have most of their peculiarities and bad points. They are narrow-chested, narrow-backed, long in the leg, and deficient in the shoulders. They are found both horned and polled, mostly of a white colour, but some of them grey, and others of a peculiar snuff or brown colour, termed in the island a *Laughton* colour. This colour, either covering the whole of the sheep, or appearing in the form of a patch on the neck, is considered as the peculiar badge of the Isle of Man sheep.

In the valleys a larger sheep, with longer wool—a proper long-woolled sheep—the fleece averaging 7 lbs., and the quarter from 12 to 16 lbs.—is found. The flesh of both breeds is said to be good, and the wool of the hill sheep is valued in the manufacture of stockings and some other worsted goods. Some attempts have been made to improve the vale breed by crosses with the South Down, Leicester, and Merino, and with considerable success.

THE EASTERN COAST OF ENGLAND.

Quitting Scotland, the eastern coast of England is now traced.

NORTHUMBERLAND

has already been spoken of, containing, in 1800, short-woolled sheep alone, comprising the black-faced and the Cheviots, and being the birth-place of the latter.

There was, however, a very singular sheep of the short-woolled breed occupying the Glendale Ward division of Northumberland, in the neighbourhood of the river Till, called the *Mugg* sheep, from their faces being so covered with wool that their eyes could scarcely be seen. The wool likewise grew down to their very toes. Their loins were high and narrow, their shoulders sharp and hollow behind, their sides flat, and their wool, although coarse, short, and hairy. They were a variety of the *short* sheep. They have given way to the equally hardy, and far superior Black-faced and Cheviot sheep*.

In 1828, the Leicesters, having penetrated thus far north, dispossessed the original sheep of full one-half of their native walks; and, at the

* Agric. Mag. 1803, p. 303.

present day, they have mingled with and changed the character of one of the aboriginal breeds of sheep, and more strictly confined the other to the pasture for which nature designed it. In

DURHAM

a greater change has been effected. It was not exclusively possessed in Luccock's time by the short-wool breed; for although he reckons 159,385 sheep of that breed in the county, and calculates that they sent into the market 3320 packs of wool, he acknowledges that 67,000 long-woolled sheep were to be found, yielding 2520 packs of wool. In 1828, however, Mr. Hubbard assigns the whole of the county to the long-woolled breed, or considers that so few short-woolled sheep remain in Durham as to be unworthy of record. In

YORKSHIRE

the long-woolled breed of sheep was, in 1800, almost entirely confined to the banks of the Humber and the Tees; the old Teeswater sheep prevailing in the latter district, and the same animal, but improved by a mixture of the Leicester blood, in the former. They consisted of about 100,000 sheep, and furnished 3200 packs of wool. Of the short-woolled variety there were more than a million sheep, producing 19,000 packs of wool. How stands the account now? The long-woolled sheep still possess the Humber and the Tees, and have also established themselves in every Riding. In the West Riding they equal the short-wools in number; and they have completely driven them from the East Riding. In the North Riding alone the short-wools maintain the ascendency—a circumstance which is easily explained by the mountainous and dreary character of that district.

The two ranges of hills, the Western and Eastern Moorlands, occupy the greater part of it. They are cold and desolate, and covered with heath, but the valleys by which they are intersected contain much good soil, and are well cultivated. The sheep that are found on them live on the open heaths all the year round. Their summer food at least, and often their winter food too, consists of heath and rushes and a few of the coarsest grasses. The long-woolled sheep could not live there, and their owners have wisely refrained from contesting the possession of these wilds.

The Moorland sheep are horned, and have black or mottled faces and legs. Their horns spread wide, and they bear much general resemblance to the Norfolks, presently to be described. Mr. Marshall says that the covering of their buttocks is mere hair, resembling the shag of the goat more than the wool of a sheep; but this is considered to be a mark of hardiness. They are small, being not much larger than the heath sheep of Norfolk. The ewes weigh from 7 to 10 pounds the quarter, and the wethers from 10 to 14.

Mr. Marshall was a good judge of sheep, and there can be no doubt that this description was accurate at the time when he wrote; but the farmers have become better informed, and the sheep have materially improved. The characteristic black spot on the neck is yet to be seen on many of them, but the South Down has penetrated to the Moorlands of Yorkshire: he has established himself on various parts of this range of mountains, or he has improved the breed that still retains possession of its native pasture; and some flocks of Cheviots find on these hills a locality suited to them. A great many of the black-faced Scots are grazed on different portions of the Moorlands. They are bought early in the summer, and sold again

before the winter. In one respect, the management of the Moorland farmers is well worthy of notice. Exposed as their sheep are to the inclemency of the weather in such a locality, much danger would attend their yeaning at the usual time. The ewes are therefore seldom put to the ram before the end of November, that the lambs may not be dropped until the snow is well melted away from the hills. The consequence of this is, that comparatively few of them are lost.

Although Mr. Hubbard does not acknowledge the production of any short wool in the East Riding, the native short-woolled sheep are not all gone. There are several flocks of South Downs, and some Cheviots and black-faced horned sheep; beside which there is a seemingly aboriginal breed with black faces and legs, but without horns. The wool is of various quality, but not held in high estimation.

In the West Riding, and on the borders of Lancashire, a breed of short-woolled sheep has existed from time immemorial. They are horned, with mottled or spotted faces and legs; some of them, however, are white-faced. They are called the Penistone sheep, from the town situated between Sheffield and Huddersfield, to which they are usually driven for sale. There is the same, or a kindred breed, in Craven. The wool is of moderate quality, and the carcase averages from 14 to 16 lbs. the quarter. It has been crossed, more towards the south of the Riding, with the Cheviot and the Leicester, and has been improved by both. The cross with the Cheviots produces an excellent breed. Towards the north it has been oftener crossed with the heath sheep, and then the legs and faces are black or grey, or spotted: but the fleece is not improved, becoming more coarse and open. John Lawrence says that "Ryeland tups have been tried with the Penistone ewes, a cross which made a considerable improvement*." This, however, was not attempted on any extensive scale, or long continued. The short-woolled sheep are diminishing in the West Riding, and the long-wools are found wherever the pasture is good enough to support them.

The comparative produce of wool in Yorkshire was, in 1828, according to Mr. Hubbard, 17,224 packs of long wool, and only 5708 of short wool.

LINCOLNSHIRE.

The lower parts are exclusively devoted to the long-wools; but although unnoticed in the tables of 1828, some short-woolled sheep mingle with the Leicester breed in the northern and western districts. Many flocks of pure South Downs are found in this part of the county, and there are some remains of an old middle-woolled sheep, which, however, is rapidly passing away. The fibre was about four inches in length, coarse, and yet weak; little sought after by the manufacturer, and not capable of much improvement. Mr. Luccock asserts that in 1800 there were nearly 124,000 short-woolled sheep in Lincolnshire; Mr. Hubbard, on the contrary, has erased them altogether from his list.

Thus journeying towards the south, before the Norfolk breed of sheep is considered it will be proper to take a hasty glance at

THE MIDLAND COUNTIES—NOTTINGHAMSHIRE.

Mr. Luccock speaks of a small breed of horned sheep with black hair on its face and legs, producing about 2 lbs. of short and fine clothing wool,

* Lawrence on Cattle, p. 418.

and which was found on the extensive tract of sand on the west of the Trent*. The forest of Sherwood contained a small polled sheep, with grey faces and legs, and yielding a fine clothing wool, but in a quantity not exceeding 1 lb. to the fleece, and the carcase seldom weighing more than 8 or 9 lbs. the quarter. Both these breeds have comparatively passed away, having been crossed and changed, or superseded, by the Lincoln and Leicester sheep, and principally by the latter; so that instead of 4112 packs of short wool, calculated by Mr. Luccock as being yielded in 1800, 6910 packs of long wool are now produced, and the short wool is passed over in utter silence. A few of the native breeds are, however, yet found in a state of comparative purity, and the South Downs have established themselves on some of the farms.

DERBYSHIRE.

The northern parts of this county used to be occupied by a breed of small sheep, with large horns and black faces and legs. The wool differed materially in quality, according to the nature of the soil or the mineral substances by which it was impregnated; but a great proportion was valued for its closeness, softness, and feltiness. There were others that were polled, with a fleece, compared with the preceding, coarse and hairy. These too have been crossed with the Leicesters and the South Downs, but with the former principally; and both the carcase and the wool have been improved, and the ewes are valued on account of the early and excellent lambs which they yield. Some South Downs are established in the south of Derbyshire, but, taking the aggregate of the county, the 4530 packs of short wool have given way to 9060 packs of long wool.

LEICESTERSHIRE.

This is one of the few counties which had not its early breed of short-woolled sheep. The forest sheep here, still to be met with in the district of Charnwood, and probably the original breed of the county—the common stock whence the prevailing sheep of the midland counties sprung—were long-wools. Some had horns and others were polled; most of them were white, but a few had their legs and faces grey; all, however, were covered with coarse combing-wool.

RUTLANDSHIRE

presents no trace of short-woolled sheep, with the exception of a few flocks of South Downs, which are not successfully contending with the improved Leicesters by which they are surrounded.

WARWICKSHIRE.

Mr. Luccock computes the quantity of short wool grown in this county to be 2287 packs, and that of long wool 3333 packs. Some wool of the former description used to be grown in the north and west of Warwickshire, yet it was a kind of middle wool, more than the short wool of that period; but, with the exception of the South Downs that have been since introduced, it would be difficult now to find a short-woolled breed in this district.

NORTHAMPTONSHIRE.

Scarcely a middle-woolled sheep can now be found in the whole of this county, with the exception of some flocks of pure South Downs; but the

* Luccock on Wool, p. 311.

old Northamptons are thus described by Mr. Donaldson in his Survey:—"About or a little before the middle of the eighteenth century, when this district was, in general, in the open field state, no attention was paid to the improvement of the breed of sheep. The points that marked a good sheep in the opinion of the people of those days were the wool thick set on the back, an open rump, loins wide, legs open, and clear from wool. They were generally sent to the market from 2½ to 4 years old, and weighed on the average about 18 lbs. the quarter. This breed is now very rare, and confined to the commons and waste lands. It was afterwards crossed by the Warwickshire sheep, noted for their great size, and the Lincolnshire, celebrated for their quantity of wool. This practice went on during many years, and the farmers gave themselves no trouble to inquire whether the increase in size and weight was beneficial or not. At length came the crosses of the new Leicester, and afterwards the substitution of the Leicesters for every other breed*." Accordingly, even in the time of Luccock, no short wool worthy of record was produced, but 16,000 packs of long wool were annually grown.

HUNTINGDONSHIRE.

in the time of Luccock, possessed many small sheep, derived principally from Cambridgeshire; the size of the carcase and the length of the wool increasing as the traveller approached the confines of Bedfordshire. Accordingly, he calculated the quantity of short wool annually shorn to be 2000 packs. The Leicesters were then rapidly establishing themselves, and yielded 2550 packs. They have now completely superseded the Cambridge blood, and the wool of Huntingdonshire is all long, and amounts to 4480 packs.

CAMBRIDGESHIRE.

There is some difficulty in determining the character of the original Cambridge sheep. It seems to have been horned, possessing considerable similarity to the Norfolk breed, with spotted faces and legs, and wool of middle length, inferior to that of the Norfolks, and differing materially in different parts of the county, and different kinds of pasture. In the fens it lost all these peculiarities, and became in a manner identified with the Lincoln sheep. The weight of wool produced by the fen sheep exceeded that from the shorter-fleeced sheep, the former being about 1400, and the latter only 1100 packs. Within the last thirty years, however, the quantity of short wool has been increasing in Cambridgeshire; for although the fen sheep have materially improved, those with short wool have made more rapid advances. The South Down blood has been introduced with decided good effect; and there are many crosses of the South Down and the Norfolk, which are much valued in Cambridgeshire, and also crosses between the South Downs and the Leicesters. The pure Downs are highly esteemed, and have established themselves in many parts of Cambridgeshire; but a cross between the Leicesters and the South Down is evidently gaining ground.

BEDFORDSHIRE.

If any decided character could be affirmed of the Bedfordshire breed, it would be that the Leicestershire blood decidedly prevails, and is to be found pure in many parts; nevertheless there are few counties that contain a greater

* Donaldson's Survey of Northamptonshire, p. 53.

variety of soils, or in which may be expected and found a greater variety of sheep. The sandy tract, which runs through the county almost from east to west, will support only a small-carcased and lighter-woolled sheep. The southern tract of chalky hills best suit the South Down, and many flocks of them are established there. In Francis Duke of Bedford this breed of sheep found an early and a strenuous advocate. After all, however, it is only on comparatively a few farms that any distinct breed of sheep can be said to prevail. Bedfordshire is one of the halting-places for sheep in their journey to the metropolitan markets. The jobbers are continually buying and selling, and driving to the various markets, almost every description of sheep, and it will necessarily happen that a distinctive breed cannot always be kept up; but, regarding the county generally, the Leicestershire is undoubtedly the prevailing breed. It is singular, however, that Luccock should characterize them all as short-wools, and Hubbard as long-wools—and that both should compute the quantity of wool to be the same, namely, 4250 packs.

HERTFORDSHIRE

is too near the metropolis to possess any distinctive breed. It also is a halting and a grazing place for the flocks ultimately destined for the London markets. Where there are established flocks, the long and the short-wools may be said to divide the county between them. The long-wools consist of the pure Leicesters, and the short-wools of the South Downs, the Wiltshire breed of them being generally preferred. Luccock consigns every Hertfordshire fleece to the short-wool division; but Hubbard, with greater truth, supposes that nearly equal quantities of the short and long-wool are produced. The soil of the larger portion of the county consists of a gravelly loam, resting on a bed of chalk, and is consequently well adapted for the production of a valuable fleece. It is free from that moisture which is injurious to the yolk, and the chalk does not lie sufficiently near to the surface to affect the quality of the wool. The proximity of Hertfordshire to the metropolis, however, determines its character as a grazing far more than a breeding district. A great many house-lambs are suckled in Hertfordshire, and particularly in the neighbourhood of Rickmansworth. Hertfordshire yields about 2900 packs of wool.

MIDDLESEX

can scarcely be expected to be a breeding county. The few sheep that are found, except as sojourners, are mostly short-woolled. They are not calculated at more than 45,000, and yield 750 packs of wool.

BUCKINGHAMSHIRE,

like Middlesex, is not a breeding county, but is much employed in the fattening of lambs and wethers for the London market. The course that has been for nearly a century adopted is to purchase ewes, wethers, or both, for this purpose in the autumn. On a dairy-farm ewes with lamb are generally bought in the autumn, and kept during the winter upon hay. The lambs are fattened and sent to the market as soon as possible in the spring, and the ewes follow them in the course of the summer. On the Chiltern Hills, and where folding is systematically adopted, wethers are purchased with the ewes, and are fattened and disposed of when ready for the market. Mr. Priest says that, supposing a farm of 400 acres has 300 sheep, 200 of them will usually be wethers to be fattened upon turnips, and 100 ewes to produce lambs for the early market—themselves following in

the course of the summer*. The breeds preferred for these purposes are the Dorset, and, next to them, the Berkshire and the Gloucester.

Some sheep, however, are bred in Buckinghamshire, Luccock says, entirely of the short-woolled variety; Hubbard says of the long-woolled. Luccock assigns to Buckinghamshire nearly 2800 packs of short wool; Hubbard calculates that it yields 4650 packs of long wool. Luccock was probably right at the time at which he wrote. On the chalky Chiltern Hills he finds the Wiltshire sheep with short clothing wool. On the hills which separate the Ouse from the waters tributary to the Thames he meets with a smaller sheep; and on the wood and common land a smaller still: but on both sides of the Ouse a middle-sized sheep, some of the fleeces having a length and tenacity adapted to the comb; and again, in the Vale of Aylesbury, a soil favourable to the growth of a heavier staple. He sums up this account with the observation, that in general the wool of Buckinghamshire is fit for the clothier's use, being short, soft, and pliable†. This summary might have been more correct if he had ranged the products of the banks of the Ouse and the Vale of Aylesbury among the long wools. Mr. Hubbard, however, is farther from the truth when he classes the fleece of the hills, and especially the Chiltern Hills, among these wools. The Leicesters have increased in number, and are excelled in few parts of the kingdom; but the Wiltshire and the Dorsets, and the Berkshire South Downs, are yet found, and the pure South Downs have become more numerous.

OXFORDSHIRE.

If the tables of Messrs. Luccock and Hubbard could be implicitly depended upon, as complete a revolution has been effected in Oxfordshire as in Berkshire: but the long-woolled sheep flourished on the banks of the Charwell, and in the greater part of the country south of Oxford, in the time of the former; and although the Berkshires have now been nearly expelled, and the Wiltshires are not so much seen, and the Leicester sheep are abundantly the most numerous in the greater part of the county, yet many flocks of South Downs are found, and which are increasing rather than diminishing.

NORFOLK.

A peculiar variety of heath sheep has been found in the counties of Norfolk and Suffolk from time immemorial. The carcase was long and slender, the legs long, the face and legs black or mottled—an unmingled and intense black being considered as a proof of purity of blood; the face long and thin, flat on the forehead, and pointed at the muzzle—the countenance lively, and expressive of mingled timidity and wildness‡. The horns of the ewes and wethers were of a middle size and somewhat straight, resembling those of the Dorset ewe: the horns of the ram long and spiral, like those of the old Wiltshire ram. The loin was wide, according to Marshall, who was a strenuous advocate of the Norfolks, but most observers would say that it was narrow; the hind quarters sufficiently large for the general make; but the fore quarters deficient, the shoulder low, and the chine sharp and unsightly; the wool short and fine, but small in quantity. Taken altogether, there was more resemblance to the deer in the Norfolk sheep than has been observed in any other species§. They fattened readily

* Priest's Survey of Buckinghamshire, p. 310.
† Luccock on Wool, p. 278. Marshall, vol. i., p. 363.
‡ Luccock on Sheep, p. 238.
§ Luccock on Wool, p. 278. Marshall, vol. i., p. 363.

at two years old; and would bear without fatigue a journey to a distant fold,—a circumstance which rendered them exceedingly valuable to the Norfolk farmer, who had often a great deal of heath-land, and no means of cultivating it but that of the fold.



Old Norfolk Ram.

Until nearly the close of the last century this sheep did not much excel the heath sheep of other districts; but its quality of thriving to a certain extent with coarse and scanty food, and its immense utility, and especially in the western part of the county, as a folding sheep, in rendering that land on which scarcely a blade of grass would grow, capable of bearing a plentiful crop of corn, could not fail of directing the anxious care of the farmer to the preservation and improvement of it. Of the wool, when the Norfolk sheep was supposed to be in its prime, Luccock thus speaks: "In the course of a few years the wool has undergone a great alteration; the colour is superior to that of the old fleece, and there is not so much coarse breech wool; the filaments are finer, and retain those excellent qualities which at first obtained them a distinguished regard among clothiers. The wool is well adapted to the manufacture of cloth, possessing a great degree of the felting property, and but little of that elasticity which often proves hurtful in the wool of some other parts of the kingdom *."

On these accounts the Norfolks were great favourites in their native districts; and there were not a few of the Norfolk farmers who preferred their own breed of short-woolled sheep to that of any other county.

It may not be uninteresting very briefly to state the points of comparison between them and the South Downs at the period now under consideration. The Norfolks were better folding sheep; and when the spirit of agriculture first began to pervade that extensive county, they were invaluable in affording almost the only manure that could be obtained. The South

* Luccock on Wool, p. 240.

Downs were good folding sheep, but they were better suited to a country in which the system of inclosure had made considerable progress. The Norfolks would bear with somewhat less injury than the South Downs a journey to distant markets, and yet no great complaint could justly be made against the latter on this account. The Norfolks possessed the property of doing well on coarse sour pastures, such as would be frequently found in a district beginning to come under arable cultivation, and which the South Downs could scarcely be induced to touch, and certainly on which they would not thrive. The Norfolks were favourites with the butcher, for they carried quite as much loose fat as any other sheep of their weight, and, generally speaking, considerably more kidney fat than any breed whatever. On the other hand, the tractable, contented disposition of the South Downs rendered them far more valuable than the wild and restless Norfolks: their superior endurance of the inclemency of the winter, and diminution of food; the quietness with which they would settle themselves in a new pasture, instead of trampling down and destroying as much as they ate; the smaller quantity of food which they consumed in proportion to their size; the superior weight which they gained from that proportion of food; the greater quantity of wool, in the proportion of three to two, which they yielded, and the readier market and higher price which it obtained; the greater number of lambs that were produced, and the superior and more attentive nursing of the ewes,—all these circumstances soon turned the balance decidedly in favour of the South Downs. The Norfolks were first crossed with them, and with evident advantage. The cross, however, was not equal to the pure South Down; and at length the superiority of the South Downs was acknowledged even in the county of their antagonists, and large flocks of them were introduced into Norfolk, and the native breed rapidly, and to a very considerable extent, diminished*.

The Norfolks, although they will not bear any comparison with the South Downs as a profitable breed of sheep, are remarkable for the delicacy

* This cannot be placed in a more satisfactory point of view than by quoting the publicly declared opinion of two very estimable men, and extensive and scientific Norfolk agriculturists, during the contest between the two breeds. The judgment which they then publicly pronounced they never saw occasion to reverse. The Earl of Albemarle presided at the Thetford Wool Fair in 1803. He stated, that, so far as his experience had gone, the South Downs were much superior to the Norfolks. He found them to produce more lambs, to be better nurses, to possess a much greater degree of hardiness, to yield more wool, and that wool to be more valuable. He kept, he said, two flocks, consisting of 900 Norfolks and 900 South Down ewes, and each having the same number of acres, and of nearly an equal quality, assigned to them. During the last year the 900 Norfolk ewes produced 752 lambs; the 900 South Downs reared 826 lambs. During the time of lambing there were always from fifteen to twenty-five Norfolk ewes penned up, in order to induce them to own and take to their lambs. Of the South Downs not a single ewe during the whole season was put into the pens or deserted her lamb. Of the 900 Norfolks eighteen died in lambing; of the South Downs only four. Of the Norfolks 15½ fleeces went to the tod of 28 lbs.; on an average of the 900 South Downs 11 fleeces made up the tod; and he obtained 2*s.* per tod more for the South Down wool than he did for the Norfolk. He thus concluded: "After having stated these facts, I shall leave it to the company to make their own comment; but for my own part I shall increase my South Down flock."—Agricultural Magazine, August, 1803.

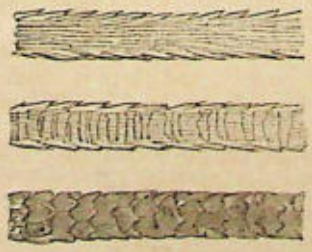
At the Norfolk Agricultural Society, July, 1809, Mr. Coke thus expressed himself: "Although the prejudices of many farmers have made them slow converts from the favourable opinion which they had entertained of the Norfolk sheep, I will challenge any man to point out to me a flock-master who has changed his Norfolk flocks for the South Downs, that ever reverted from the South Downs to the Norfolks again. It is the farmer's object to keep that breed which is the most profitable, and the superiority of the South Downs is now universally acknowledged."—Agricultural Magazine, July, 1809.

of the mutton which they produce, and will probably be long preserved as a luxury for the tables of the rich.

Agriculture made rapid progress in Norfolk, and the food of the sheep became more abundant and nutritious; more so, in fact, than in many other counties. Mr. Herbert, an excellent writer on many points of agriculture, says, that "after the summer and autumnal pastures and seed and meadow grass mowings are consumed, they feed both their breeding and fattening, as well as their young store sheep and lambs, upon meadow and seed hay, winter tares, and turnips, both Swedes and round. The Norfolk farmers and graziers seem much more partial to turnips than any other green winter food. They generally allow an acre for every ten fattening wethers or twelve breeding ewes; and when these do not perfectly consume their allowance, they are followed by the tegs, or previous year's lambs, who generally make very clean work of it, while they contribute materially to the improvement of the soil*.

The genuine Norfolks that now remain, and all the various crosses, and various they are, between the old sheep and the South Downs, and the Leicesters, and also the pure South Downs and the Berkshire and Wiltshire varieties of them have participated in the improvement of agriculture in this county, and have been materially changed by it. They have increased in bulk and in aptitude to fatten, and in weight and length of fleece. The fleece that used to weigh from 2 lbs. to 2½ lbs., including the hogget, is now increased to 3½ lbs. and 4 lbs., but there has been, until lately, a corresponding deterioration in the price. The farmer who attends chiefly or almost exclusively to his wool, has not felt this so much; but he who, instead of fattening and selling his sheep between two and three years old, is now forcing them on, and selling them from one to two years, must expect that some of the extra nutriment which is allowed them will be expended on the fleece, and that it will become longer, coarser, and heavier. Mr. Coke has established a most valuable breed of sheep at Holkham: it is a cross between the South Down and Hampshire. It yields a greater quantity of mutton, and that with the desirable proportion of lean meat, and more of that useful wool which the altered fashion of the times demands. Particular attention is also paid to the hoggets; they are preserved with great care, and more abundant and nutritive food is given to them†.

The reader is here presented with a fair sample of Norfolk wool of the last year's growth.



1. Is the appearance of the fibre when viewed as a transparent object. The diameter is the $\frac{1}{1}\frac{1}{0}$th of an inch, or finer than that of the pure South Down; the serrations are only 10 in the 40th part of an inch, or 1600 to the inch. The number of serrations in the South Down wool was 13 in the field of view, or 2050 to an inch. They are long,

* British Farmer's Magazine, Nov. 1830.

† Mr. Fison's Evidence before the House of Lords.

weak, gradually eluding the sight, and having no hook. They look as if they were spliced to the stem of the fibre. They present the character of easiness of felt, and attended with more softness than the South Down, but not so much strength of fibre.

2. Represents the same wool combed. The serrations are very indistinct, and some of them have altogether disappeared. It is well adapted for combing purposes, and would retain much of its softness and pliancy.

3. Gives a somewhat indistinct picture of the vegetable-like structure of the wool. The deep divisions of the leaves of which the cup is composed can be satisfactorily traced. About five of them would complete the cup.

The wool is principally sent into Yorkshire and Lancashire, and made into flannels, or it is mixed with foreign wool and made into low cloths. From the fine broad cloths it is, like the South Down wool, altogether banished. The quantity of wool produced in Norfolk was computed by Luccock to be 5700 packs of short wool, and 1120 of long wool. Mr. Hubbard imagines that the short wool has decreased to 4300 packs, and the long wool increased to 8550 packs. However this may be, it is certain that the whole quantity of wool produced in this county has been doubled within the last twenty years. More sheep are kept on the marsh land; a greater quantity of wool is yielded by each sheep in the more cultivated districts, owing to the improved system of agriculture; while thousands of sheep are now kept on land on which, twenty-five years ago, scarcely one was to be seen *.

Mr. Herbert thus calculates the dead weight of the present breed of Norfolk sheep. The cross between the Norfolk and the South Down—the wether from 8 st. 4 lbs. to 12 st. Smithfield weight, or from 4 st. 12 lbs. to 6 st. 12 lbs. imperial stone of 14 lbs.; and the ewe from 7 st. to 10 st. 4lbs. Smithfield weight, or from 4 st. to 6 st. imperial weight. The cross between the Norfolk and the Leicester—the wether from 9 st. 4 lbs. to 13 st. Smithfield weight, or from 6 st. 6 lbs. to 7 st. 6 lbs. imperial weight, and the ewe from 8 st. 4 lbs. to 11 st. 4 lbs. Smithfield, or 4 st. 12 lbs. to 7st. 2 lbs. imperial.

SUFFOLK.

This can scarcely be called a breeding county, so far as it relates to sheep, although there are some large breeding flocks in it. There are not so many Leicesters, or crosses with the Leicesters; but the principal business of the farmer is to rear early lambs for the butcher. For this purpose he uses South Downs almost exclusively, which are sold as soon as they get fat. Ipswich lamb fair is the market whence the farmer principally obtains his sheep, and nearly 100,000 sheep and lambs are there exposed for sale every year. The quantity of short wool yielded by the Suffolk short-woolled sheep was estimated at 5176 packs. It has increased, according to Mr. Hubbard, to 8800 packs; and although the worsted manufacture has existed in Suffolk from the 14th century, and there is much land on which a long-woolled sheep might be profitably bred, a sufficient quantity of that staple worthy of record is not produced in the whole of the county. This is another of the numerous instances that have been stated in this work of the triumph of prejudice and obstinate adherence to old customs and ways over the suggestions of interest and common sense.†

ESSEX.

Mr. Luccock speaks of a native breed of sheep in Essex yielding a long and coarse fleece, weighing about 4 lbs.; and of little light mountain

* Mr. Fison's Evidence before the House of Lords.

† Luccock on Wool, p. 247.

animals, with some features that resemble the stock of the Principality, found upon Epping Forest, and on the numerous commons with which Essex abounds. The former have entirely passed away, and comparatively few of the latter remain. In fact, this county is now inseparably connected with the supply of the London markets. It is the last stage at which a great many of them halt, and especially the different crosses of the Norfolk with the South Downs and the Leicesters. If any sheep can be termed favourites here, and bred more extensively than others, they are the South Downs. Essex yielded nearly 6500 packs of short wool in 1800, and that quantity has now increased, according to Mr. Hubbard, to 8650.

Chapter VIII.

THE LONG-WOOLLED BREEDS OF SHEEP.

Although there is reason to believe that the short wool was used in the manufactory established at Winchester by the Romans, it is not to be thence concluded that this was the only kind of fleece which the British sheep then yielded. In all the different districts of the kingdom we find various breeds of sheep beautifully adapted to the locality which they occupy. No one knows their origin; they are indigenous to the soil, climate, and pasturage, the locality on which they graze; they seem to have been formed for it and by it.

There was a sheep-walk in Norfolk stocked jointly with Lincolnshire and Norfolk sheep; the first large and inactive, the others agile and light. This walk contained also a variety of soil: one part, lying low, yielded a plentiful but coarse herbage; the other, lying higher, had a dryer, lighter soil, and bore a hard benty grass. The sheep of both kinds were bred on this walk, yet, whenever they were turned on it, they would in a short time separate themselves even to a sheep: the Lincolnshire would draw off to the Lincolnshire soil, and the Norfolks to their own dry, sandy loam; and while there continued to be grass in both parts, the two breeds would keep themselves perfectly distinct*.

In the same manner, probably, from the time that Britain was first inhabited, the different localities and pastures of the kingdom were covered by an appropriate breed of sheep, which the art of man might improve in many respects, but which he could never essentially change. The long-woolled sheep could not traverse or endure the rigour of the mountains of the north, and the short-woolled one would assume another dress and character on the luxurious pastures of the valley.

Historians had something else to write about besides the localities of the different breeds of sheep, and the kind of wool of which certain fabrics were composed; we are, therefore, not able to trace the rise or the existence of the two families of sheep in the earliest records of our island. In the twelfth century, however, accounts are given of the exportation of wool from England to the continent. The kind of wool is not then mentioned; but circumstances, afterwards occurring, prove that it was for the supply of the serge manufactories in Flanders and in Spain, and, consequently, that it was long wool. It soon obtained a high character, and was in great request among the foreign merchants; and in the fifteenth century a royal present of Cotswold wool was sent to the King of Portugal.

* Marshall's Norfolk, vol. ii. p. 75.

Some writers, without a shadow of authority, refer to the importation of the Leicester and Lincolnshire sheep a little before the middle of the last century. They had occupied those districts from time immemorial, and had mainly contributed, by the duty on the exportation of their fleece, to support the splendour of the British throne during many a successive reign.

There is much more similarity between the long-wools than those of shorter fibre. The length, the colour, the weight, and the uses of the wool, coincide to a remarkable degree; and the animals themselves give undeniable indications that they belong to the same family. In the want of horns, the form of the head, the expression of the countenance, and the white faces and legs, they all agree; and it is but to study the character of one of them in order to have a tolerable conception of the long-woolled sheep generally. They belong to each other, and the history of some of them can be traced through many a century. They were, as truly as the short-wools, aboriginal inhabitants of our islands*.

In reviewing them, it will be convenient to begin with that variety which in the course of the last half-century has materially changed the character, and value, and uses of all the rest.

THE OLD LEICESTER SHEEP.

This was a large, heavy, coarse-woolled breed, common to most of the midland counties, and reaching from the south of Yorkshire, and the Yorkshire Wolds, as far as Oxfordshire and Gloucestershire. It had a white face, no horns—it was long and thin in the carcass, flat-sided, with large bones—thick, rough, and white legs—and weighing, the ewe from 15 to 20 lbs., and the wether from 20 to 30 lbs. the quarter. It was covered with wool from 10 to 14 or 15 inches in length, coarse in quality, and weighing from 8 to 13 lbs. The pelt and offal were thick and coarse; the animal was a slow feeder, and the flesh was coarse-grained, and with little flavour.

THE NEW LEICESTER SHEEP.

"That larger sort, of head defenceless, seek,
Whose fleece is deep and clammy, close and plain;
The ram short-limb'd, whose form compact describes
One level line along his spacious back.
Of full and ruddy eye, large ears, stretched head,
Nostrils dilated, neck and shoulders broad,
And spacious haunches."†

In page 110 a description was given of the new and improved Leicester. The principles on which the attempt to effect this change was founded, the means by which it was accomplished, and the important consequences which it has produced, demand some lengthened detail, because they had so beneficial an effect upon all the different breeds of domestic animals. For several of the first pages of this detail, the author is indebted to one whose name he may hereafter have the power and the pride of divulging; but at present he can do no more than append a few notes in elucidation or corroboration of the opinions here stated.

It was about the middle of the last century that Mr. Bakewell of Dishley, near Loughborough, in Leicestershire, first applied himself to the endeavour to improve the then existing breed of sheep in that county. Up to this period very little care had been bestowed upon the breeding of sheep‡.

* Luccock on Wool, p. 154.
† Dyer's Fleece, Book I.
‡ It is commonly believed that, a little before Mr. Bakewell's time, a farmer of the

Two objects alone appear to have engrossed the attention of the breeders; first, to breed animals of the largest possible size; and, secondly, such as should produce the heaviest fleeces. Aptitude to fatten, and symmetry of shape, that is, such shape as should increase as much as possible the most valuable parts of the animal, and diminish in the same proportion the offal, were entirely disregarded.

Mr. Bakewell perceived that smaller animals increased in weight more rapidly than those very large ones; and that they consumed so much less food that the same quantity of herbage applied to feeding a larger number of small sheep would produce more meat than when applied to feeding the smaller number of large sheep which alone it would support. He also perceived that sheep carrying a heavy fleece of wool possessed less propensity to fatten than those which carried one of a more moderate weight.

Acting upon these observations he selected from the different flocks in his neighbourhood, without regard to size, the sheep which appeared to him to have the greatest propensity to fatten, and whose shape possessed the peculiarities which he considered would produce the largest proportion of valuable meat, and the smallest quantity of bone and offal.

In doing this, it is probable that he was led to prefer the smaller sheep, still more than he had been by the considerations above stated, because it is found that perfection of shape more frequently accompanies a moderate-sized animal than a very large one.

He also was of opinion that the first object to be attended to in breeding sheep was the value of the carcase, and that the fleece ought always to be a secondary consideration. The reason for this is obvious: the addition of two or three pounds of wool to the weight of a sheep's fleece is a difference of great amount; but if to procure this increase a sacrifice is made of the propensity to fatten, the farmer may lose by it ten or twelve pounds of mutton.

The sort of sheep, therefore, which Mr. Bakewell selected were those possessed of the most perfect symmetry, with the greatest aptitude to fatten, and rather smaller in size than the sheep then generally bred. Having formed his stock from sheep so selected, he carefully attended to the peculiarities of the individuals from which he bred, and, it appears, did not object to breeding from near relations, when by so doing he put together animals likely to produce a progeny possessing the characteristics that he wished to obtain.

Mr. Bakewell has been supposed by some persons to have formed the new Leicester variety by crossing different sorts of sheep; but there does not appear to be any reason for believing this: and the circumstance of the new Leicesters varying in their appearance and qualities so much as they do from the other varieties of long-woolled sheep, can by no means be considered as proving that such was the system which he adopted. Every one who has attended to the breeding of domestic animals must have experienced that, by careful selection of those from which he breeds, and with a clear and defined conception of the object he intends to effect, he may procure a progeny in which that object will be accomplished.

name of Allom, of Clifton, in Leicestershire, possessed a superior breed of long-woolled sheep, and that the neighbouring farmers, and many from a distance, purchased ram-lambs from him, for which they paid him the extravagant sum, at that time, of two and three guineas per head. This does not in the slightest degree interfere with Mr. Bakewell's claims; it would rather be creditable to him that he was eager to tread in the same path; that he beyond comparison excelled his predecessor; and that while the character of Mr. Allom's sheep is now utterly forgotten, Bakewell's sheep still remain in all their pristine perfection, and unrivalled in their own country or in the world.

At the present time, in the new Leicester breed of sheep, a practical proof of this may be seen in the flocks of Mr. Buckley and Mr. Burgess. Both of these flocks have been purely bred from the original stock of Mr. Bakewell for upwards of fifty years. There is not a suspicion existing in the mind of any one at all acquainted with the subject that the owner of either of them has deviated in any one instance from the pure blood of Mr. Bakewell's flock; and yet the difference between the sheep possessed by these two gentlemen is so great, that they have the appearance of being quite different varieties. This difference, however, has only been produced by their respective owners having pursued with perseverance a different system; one of them having aimed at attaining merits of one description, and the other having aimed at attaining merits of a different nature.

This being the case, and there not existing any well-authenticated facts, or, indeed, any facts resting upon any authority whatever, to prove that the New Leicester breed of sheep were produced by Mr. Bakewell by crossing different sorts, it is highly probable that it was improved to its present state of perfection simply by selection from the then-existing breed of long-woolled sheep.

Having thus established his flock, Mr. Bakewell adopted a practice, which has since been constantly followed by the most eminent breeders of sheep: this was to let rams for the season, instead of selling them to those who wished for their use. This is an improvement of great value, beneficial alike to the proprietor of the ram, and to the person who hires him. It enables the ram-breeder to keep a much larger number of rams in his possession, and, consequently, greatly increases his power of selecting those most suitable to his flock, or which may be required to correct any faults in shape or quality that may occur in it; it also enables him, by cautiously using a ram for one season, or by observing the produce from a ram let to some other breeder, to ascertain, by actual observation of the produce, the probable qualities of the lambs which such ram will get, and thus saves him from the danger of making mistakes which would deteriorate the value of his stock. This system is equally beneficial to the farmers who hire the rams: it gives them the opportunity of varying the rams from which they breed much more than they otherwise could do; and it also gives them the power of selecting from sheep of the best quality, and from those best calculated to effect the greatest improvement in their flocks.

The effect of this system has been to introduce a sort of division of labour into the breeding of sheep: some flock-masters applying themselves almost exclusively to the rearing of rams for the purpose of letting them, and finding it, therefore, their interest to apply a more minute attention to improving the valuable qualities of their sheep than the time or other opportunities of an ordinary farmer could permit him to do; while the ordinary farmer gains the advantage of this attention paid by others, and is tolerably sure of always procuring a ram, which, without such minute attention on his part, will keep his flock in a profitable and improving state. It is said that when Mr. Bakewell first determined to adopt this practice, the idea was so novel that he had great difficulty in inducing the farmers to act upon it, and that the first sheep he let was let for sixteen shillings. Since then a sheep has been let for the season at a thousand guineas, and many others for prices approaching that sum *.

* It was about the year 1760 that this first ram was let to Mr. Wilbore, of Illson-on-the-Hill, and two others were let at the same fair and on the same day at 17*s.* 6*d.* each. Mr. Bakewell "had great difficulty in inducing the farmers to act upon his plan. His whole scheme of improvement was ridiculed and opposed, and most of all by those who

After the reputation of Mr. Bakewell's flock had been established, and its superiority over that of any other breeder then existing very generally lived in his immediate neighbourhood. In fact, he shared the common fate of those whom posterity hail as the best friends of their country.

He, however, had deeply considered the course which he was pursuing; and being confident of ultimate success, he held on his way. He received sometimes a guinea, and on rare occasions two or three, for the use of a ram; but it was not until the year 1780 that he began to receive a remunerating price for them. This was a long struggle against the ignorance and prejudice and jealousy of his brethren—a struggle of 20 years.

In 1780 he received ten guineas for the hiring of some of his choicest rams; and, his reputation as a successful breeder being now completely established, the remuneration which he so well deserved rapidly increased, so that in 1784 and 1785, the hiring of his best rams had risen to 100 guineas.

In 1786 Mr. Bakewell let two-thirds of one ram (reserving to himself one-third of the usual number of ewes) for 200 guineas, rating the entire service of the ram at 300 guineas. In that year he received more than 1000 guineas for the letting of rams. In 1789 he made 1200 guineas by three rams, and 2000 guineas by seven others. He likewise received 3000 guineas from the Dishley Society for the use of the rest of his stock*.

The most extraordinary letting which occurred was that of a favourite ram called Two-pounder, for the use of which during one season he obtained 400 guineas each from two breeders, still reserving one-third of the usual number of ewes for himself, the value of the ram for that season being thus estimated at 1200 guineas. "There is a consolation, if not a complete remedy, for almost every thing," says Captain Basil Hall, "and by honourable means and persevering exertions, there are few difficulties which may not be surmounted."

The business of letting rams was soon adopted by other farmers, who had previously hired of Mr. Bakewell, and who had thus obtained a valuable flock; and calculating the average letting at ten guineas, and the number of persons hiring rams at 1000 (and such is the fickleness of human opinion, that they soon far exceeded that number), 10,000*l.* a year were expended by the Midland and other farmers in this way†. Lawrence multiplies this by ten, and calculates that 100,000*l.* were annually spent by the Midland farmers in the hiring of rams. This, however, is scarcely credible.

Some rams were kept at home by Mr. Bakewell and others; the usual price for having ewes tupped by them was from ten to sixty guineas per score‡. Mr. Marshall gives a long account of the manner in which this ram-letting was managed, an abstract of which may be interesting to the reader. Before the season of business, the rams were reduced from the cumbrous state of fatness in which they were shown. At the middle of September the time of sending them out commenced, and they travelled to their place of destination in carriages hung on springs. Instead of turning the ram loose among the ewes at large, he was placed in a small inclosure, two ewes being left with him to induce him to rest quietly. The ewes were then brought to him singly, and each was served once only; by this means, from 100 to 120, instead of the usual number of 60 or 80, were served by one ram in the course of the season. The hirer was expected to keep him well, to permit him to serve none but his own ewes, and only the stipulated number of them, and to send him home safe about the beginning of December. The owner, on receiving him, immediately set to work to get all his former fat upon him, and to make him look as handsome as ever for the next show.

As to the ewe, as much care and thought were necessary with regard to her as with regard to the ram. In the first place, it was necessary that she should be deeply tinctured with the Dishley blood, in order to produce an offspring that would possess the true Dishley qualities. She was to be perfect in flesh, fat, form and wool; she should have been at moderate keep, and without any alteration of pasture, unless double lambs were desired, when she might have a flush of keep for a little while before she was put to the ram; it being, however, remembered that all this has reference not to the kind of keep which the farmer usually allows, but to the extra nourishment which these high bred animals are always indulged in. (It was objected to the new Leicesters, when they were beginning to establish themselves, that they were not so prolific as either the South Downs or the old Leicesters. The true principle of breeding has been brought to bear upon this point, as well as others, and the objection is now greatly diminished where the flock is kept in good condition, and not deteriorated and debilitated by an injudicious system of breeding.) There was no difference from the usual keep during the winter,

* Marshall's Midland Counties, vol. i. p. 426. † Ib., p. 427. ‡ Ib., p. 430.

admitted, he was enabled to establish the Dishley Society. There can be little doubt that the object which he had principally in view in forming this Society was to promote his own interest, and that of the members of the Society, and its establishment has very mainly contributed to preserve the purity of the new Leicester breed, and has thus been very beneficial to the country. Its principal rules are,—

1st. No member shall hire or use a ram not belonging either to Mr. Bakewell or to one of the members of the Society.

2nd. No member shall give his rams, at any season of the year, any other food than green vegetables, hay, and straw.

3rd. No member shall let more than thirty rams in any one season.

4th. No member shall let a ram for less than ten guineas to any person, nor for less than forty guineas to any person who lets rams.

5th. No one ram shall be let to serve the flocks of more than two persons.

6th. No member shall let a ram to any one who lets or sells his rams at fairs or markets.

7th. No member shall take in ewes to be served by more than one ram, at his own residence, in any one season, unless they belong to members of the Society, nor to be served by any ram he uses for his own flock, with the same exception.

8th. Mr. Bakewell engages not to let any ram for less than fifty guineas to any person residing within one hundred miles from Dishley.

9th. No member shall let a ram to any person residing within thirty miles from Leicester, and not being a member of the Society, who shall have hired a ram of Mr. Bakewell during the preceding season.

10th. No member shall sell any ewes or rams of his own breed, to breed from, unless he sells his whole flock of sheep, except to members of the Society.

11th. From the 1st to the 8th of June the members shall not show their rams, except to one another. They shall begin their general show on the 8th of June, and continue to show their rams till the 8th of July:

but the utmost attention during lambing time. From the period of lambing to that of yeaning, the ewes were indulged with more and better food, in order that the lamb might be pushed on as quickly as possible, and because the Leicester ewes are occasionally deficient in milk. The time of weaning was the latter end of July or the beginning of August. The ewe lambs were put on good keep, but somewhat inferior to that of the rams, and they were kept from the ram during the first autumn*.

The ram-lambs that were kept for breeding were selected more on account of their parentage or blood than their form; for full dependence could not be placed on that at so early an age. From the weaning-time in July or August, to the shearing-time in the following August, they had every indulgence of keep. Clover that had been mown early and got a second time into head was usually their first food; and after this, turnips, cabbages, &c., with hay and corn. Such shearlings as did not possess the requisite form and fatness were castrated, or sent to the butcher. In shearing-time the rams were exhibited in lots of four or five of the same age, or singly: the choice of the ram was guided by the object of the hirer. If his object was to get rams for the improvement of the breed or for hire, he selected one with a small head, light bone, good flesh, and beautiful form; he trusted to his ewes and the natural tendency of the breed to bestow on the offspring size and substance. The grazier looked for strength of frame, in addition to form. This was the distinction between the "ram-getter" and the "wedder-getter." No price was set on the rams, but the hirer made his own valuation, and bid what he pleased. The hiring was not rendered legally binding by any written articles, but left to the honour of the parties; and the price was not paid until the ram, or another as good, had impregnated the stipulated number of ewes; and if he died while he was away, whether through disease, accident, or neglect, the loss fell on the letter.

* Marshall's Midland Counties, vol. i. p. 438.

from that day until the 8th of September they shall not show them to any one, but shall then open their show again, and continue it until the end of the season.

12th. On the 8th and 9th of June, although the rams may be shown, no ram shall be let or engaged to be let, nor shall the price which will be required for him be mentioned by any one.

13th. Every member, refusing or neglecting to abide by the rules of the Society, or withdrawing himself from it, shall no longer be considered a member. From that time he shall not be permitted to hire any ram or share of a ram from any of its members, until readmitted into the Society at a general meeting.

From the inspection of these rules, it will be evident that the tendency of the first four was to preserve the purity of this new breed of sheep, and the peculiar excellencies of the sort; because, while the first rule renders it impossible that any ram should be used by a member of the Society, which was not purely bred, the 2nd, 3rd, and 4th render it probable that no ram, except such as possessed considerable merit, could be let. The remaining nine rules have for their object evidently the establishment of as close a monopoly as could be effected among the members of the Society.

Such is the origin of the New Leicester breed of sheep, which have within little more than half a century spread themselves from their native county over every part of the United Kingdom, and are now exported in great numbers to the continents of Europe and America. Such, indeed, have proved to be their merits, that at the present day there are very few flocks of long-woolled sheep existing in England, Scotland, or Ireland, which are not in some degree descended from the flock of Mr. Bakewell. A pure Lincoln or Teeswater flock is very rarely to be found; and although some flocks of the pure Cotswold breed remain, in the greatest number of instances it is probable that they have been crossed with the New Leicesters.

No other sort of sheep possesses so great a propensity to fatten—no other sort of sheep is fit for the butcher at so early an age—and although they are not calculated for the poorest soils, where the herbage is so scanty that the sheep must walk over a great deal of ground for the purpose of procuring his food, no other sort of sheep, in soils of a moderate or superior quality, is so profitable to the breeder.

They vary very much in size, weighing at a year and a half old, with ordinary keep, from 24 to 36 lbs. per quarter. In this respect, therefore, they are inferior to the Lincoln, the Cotswold, and the Teeswater sheep. By crossing them with either of these sorts, the size of the sheep may be considerably increased; and it is said that this may be done without diminishing perceptibly either their inclination to become fat, or the early maturity for which they have always been remarkable. It would, however, be very unfortunate if the temptation which this increase of bulk holds out to the breeders, was to have a tendency to diminish the stocks of pure-bred New Leicesters at present existing, because there can be little doubt that it will be always essential to the preservation of the peculiar merits of this sort of sheep that the breeders may be able to have recourse to pure-bred rams.

The preference which Mr. Bakewell was inclined to give to a smaller race of sheep than the ordinary long-woolled sheep were at the time he commenced his improvements, and the decision he came to of attending more to the carcase than the fleece of the sheep from which he bred, undoubtedly led some of his immediate followers into considerable mis-

takes. They seem even to have imagined that want of size was a merit of itself, and instead of looking to the fleece of the sheep as a secondary consideration only, neglected it entirely, or even preferred sheep with bad fleeces to those with good ones. At present, however, these mistakes are corrected, and the principal breeders of the New Leicester sheep give their due and sufficient weight to all the qualities which are likely to produce a profitable animal *.

We have said above, that the principles on which Mr. Bakewell acted have been of essential benefit to all the different breeds of our domestic animals. The great improvement which he made in the breed of sheep proved how important it is to a breeder of animals to attend to the peculiarities which distinguish the parents, and so to put the males and females together as to remedy any defects which may exist in either. Previous to the time of Mr. Bakewell, the importance of this care had not been understood; but the attention of breeders having been then called to it, the reasonableness of the principle was apparent, and it has since been attended to, more or less, by all those who have been anxious to improve their stock †.

The result of the diffusion of the new Leicester sheep through every part of the United Kingdom is, that both friends and foes have been enabled to put fairly to the test their supposed excellencies and defects; and there seems now to be a common agreement of opinion, if not pre-

* The following is the account which Mr. Luccock gives of the actual improvement of the wool in the new Leicesters:—"Throughout this extensive tract, (from Staffordshire to Derby and Rutland,) the Dishley breed of sheep has been generally cultivated. Its qualities have been infused not only into the flocks which graze upon the most valuable lands, but into those which lodge upon fallows, and in some instances have penetrated the close-bitten commons. The staple which it produces is from five to seven inches long, very commonly well-formed, and of a colour beautifully white; and there are few districts in the kingdom, I conceive, where the fleece is kept so clean, or sent to market in such good order, and not many where the grazier has been more amply repaid for his attention to the coat as well as the carcase of his sheep. When compared with the ancient stock of the county, they yield a larger quantity of wool on a given surface than that formerly produced; and being cleaner than the sheep formerly were, the intrinsic weight of the wool produced by an individual is not very deficient. The fleece is softer and finer, more evenly grown, and possessing some other qualities of wool in great perfection; and although too short and weak to be admitted among the first ranks of combing wool, is well adapted to the manufacture of worsted yarn, and has become very useful in the hose-trade."—*Luccock on Wool*, p. 212.

The following instance of the extraordinary produce of wool from a yearling pure Leicester ram, and also of his excellent condition, deserves to be placed on record. He was bred by Mr. Howgate, of Hay Park, near Knaresborough. He was yeaned in 1822, and had no other extra food than a few oats and beans. He was shorn on the 21st of April, 1823, and produced 17½ lbs. of good wool, without salve; his live weight without wool was 17 st. 8 lbs. imperial weight, or 246 lbs.—*Farmer's Journal*, *June* 16, 1823.

† "It will most probably come out that no cross with any alien breed whatever has been used, but that the improvement has been effected by selecting individuals from *kindred* breeds—from the several breeds or varieties of long-woolled sheep with which Mr. Bakewell was surrounded on every side; and by breeding in and in with this selection, solicitously seizing the superior accidental varieties produced, associating these varieties, and still continuing to select with judgment the superior individuals."—*Marshall's Midland Counties—Sheep*, vol. i.

The state of improvement to which he brought his flock cannot be better expressed than in the language of Lord Somerville:—"To such extreme perfection has the frame of this animal been carried, that one is lost in admiration at the skill and good fortune of those who worked out such an alteration. It would seem as if they had chalked out upon a wall a form perfect in itself, and then had given it existence."—*Somerville's Illustrations*, p. 59.

Mr. Paget, of Ibstock, was an associate of Mr. Bakewell, and an ardent and successful breeder of the new Leicester sheep. His stock of ewes was sold by auction on Nov. 16, 1793. The prices which they fetched and the names of the purchasers should

cisely between these two opposite classes, yet between all impartial judges. The new Leicesters, on good keep, will yield a greater quantity of meat, for the same quantity of food, than any other breed of sheep can do. This is their fundamental character and excellence. On moderate keep they will do as well as most breeds: but they cannot travel far for their food, nor can they bear, so well as many others, occasional scantiness or deprivation of nourishment. These properties plainly mark out for them the situation in which they should be placed, and the purposes for which they should be bred.

The kind of meat which they yield is of a peculiar character. When the sheep are not over fattened, it is tender and juicy, but, in the opinion of many persons, somewhat insipid. When they are raised to their highest state of condition, the muscles seem to be partially absorbed; at least much fatty matter is introduced between their fibres. The line of distinction between the fat and the lean is in a manner lost, and, with the exception of a few joints and a small part of them, the carcase has the appearance and the taste of a mass of luscious fat. There is the same difference between the overfat Leicester and South Down, which there is between the short-horn and the Kyloe when forced into an unnatural state of condition. This, however, is no solid objection to the breed. It marks the point, easily attained, to which the fattening process should be carried, and where it should stop. It marks the character of the animal, and the profit which may be derived from it, and it is the fault of the grazier if he converts an excellence into a nuisance.

It is to be doubted whether this disposition to over fatness remains to as great an extent as it did in the early existence of the New Leicesters. Whether it arises from the fashionable but injurious system of many of the cultivators of these sheep, or from some gradual impairment of the constitution of the breed, there can be no doubt that the size of the New Leicesters has materially diminished. Occupying the same farm, and the

be placed on record as a proof of the estimation in which the new Leicesters were then held, and as a just tribute of respect to the early and zealous improvers of the breed.

Ewes.	Guineas each.	Guineas.	Purchasers.
5 . .	at 62 . .	310	Mr. Buckley.
5 shearlings	52 . .	260	Pilkington.
5 ditto .	45 . .	225	Pilkington.
5 . .	30 . .	150	Breedon.
5 . .	30 . .	150	S. Stone.
5 . .	29 . .	145	Bennett.
5 . .	25 . .	125	Bennett.
5 . .	22 . .	110	S. Stone.
5 . .	22 . .	110	Boyer.
5 . .	20 . .	100	Stubbings.
5 . .	20 . .	100	Tomalin.
5 . .	20 . .	100	Freyer.
5 . .	20 . .	100	Deverell.
5 . .	20 . .	100	Martin.
5 . .	20 . .	100	Lord Egremont.
5 . .	18 . .	90	Mr. Wingfield.
5 shearlings	17 . .	85	Meland.
5 . .	16 . .	80	Powrise.
5 . .	16 . .	80	Lord Egremont.
5 shearlings	16 . .	80	Harborough.
30 before the sale by private contract,	20 . .	600	
130 at, on the average, 25*l.* 16*s.* 11*d.* each; whole amount £3200			

cultivation of that farm being the same, the management unchanged, and the sale taking place at the same time of the year, there is an evident diminution of both live and dead weight. This, perhaps, may be chiefly owing to the continued application of that principle which did credit to the judgment of Bakewell when he was surrounded by large and coarse animals only, namely, to look to symmetry alone, and to trust to chance or to nature for the size and weight; but which must have an injurious tendency when the characteristic of the breed is neatness and beauty of form. The heaviest pure New Leicester sheep, of which there is any authentic account, belonged to Mr. Morgan, of Loughton: its live weight was 368 lbs., and the weight of the carcase 248 lbs. It was killed in April, and had been with the ewes until November the 1st*. The heaviest of Mr. Painter of Burghley's pen of 32 months old Leicester wethers exhibited at the Smithfield cattle show in 1835 weighed but 165 lbs.; the two others were 155 lbs. and 143 lbs. The three South Downs, of the same age, exhibited by Mr. Stephen Grantham, of Stoneham, weighed 168 lbs., 165 lbs., and 163 lbs.

The Leicester sheep were never favourites with the butcher, because they had little loose inside fat. It has been well said that "tallow is a kind of boon which, if not forthcoming, produces a disappointment that the butcher cannot brook." It ought, nevertheless, to have been recollected that the smallness of the head, and the thinness of the pelt, would in some measure counterbalance the loss of tallow: that there is that about the Leicester sheep which would fully make amends to the butcher for the diminution of offal, namely, the property of weighing considerably more than the appearance of the animal would indicate; and that this very diminution of the offal, whatever the butcher may think of it, is advantageous to the grazier, for it shows a disposition to form fat outwardly, and is uniformly accompanied by a tendency to quickness of improvement.

It must also be conceded that the New Leicester sheep has a smaller quantity of bone in proportion to its weight than is to be found in any other breed, a circumstance highly advantageous to the consumer, although, in more ways than one, it may not be so profitable to the butcher.

There is another good quality in the New Leicesters of essential importance, namely, their early maturity. They are sooner prepared for the butcher than any other description of sheep, and the pasture left ready for other purposes. This was undeniably the case when they were first introduced. It was a point which, for many years afterwards, their most prejudiced enemies could not deny. Mr. Price, in his Treatise on Sheep, gives a satisfactory illustration of this. "In the spring of 1806 I called upon the Earl of Thanet, in Kent, in order to view his breed of sheep: his Lordship is for giving every breed a candid trial. He then had the New Leicesters, the South Down, and the Romney Marsh breeds together. He informed me that the New Leicester breed suited his purpose far better than any of the others, for they were ripe for the slaughter-house in April; whereas the South Down and the Kents would not be so until the latter end of the summer. The advantage which he received was that of making two returns on his pastures†."

Great improvement has been effected in the system of sheep husbandry since that time, and other breeds of sheep have materially advanced. Between some of them and the Leicesters it would occasionally be a neck and neck race, or the old favourites might now and then be left behind; but, as a general rule, and all circumstances being equal, the New Leicester

* Farmer's Journal, April, 1822. † Price on Sheep, p. 186.

sheep will get the start of their competitors; and they will not be left behind, although dearer and more stimulating food than used to be allowed is given to their rivals.

The New Leicesters, however, are not without their faults. They are not, even at the present day, so prolific as most other breeds. This was too much overlooked in the time of Bakewell and his immediate followers. Their object was to produce a lamb that could be forced on so as to be ready, at the earliest possible period, for the purposes of breeding or of slaughter, and therefore the production of twins was not only unsought after, but was regarded as an evil. It was considered that, during the period of gestation, few ewes would be able to bring to their full fœtal growth two such lambs as the Leicestershire breeders desired to have. The fact, also, which, if they had seriously thought of the matter, must have appeared to be unavoidable, too soon began to be evident, viz., that when the energies of the system were systematically directed to one point—the accumulation of flesh and fat as early and to as great an extent as possible—there must be a deficiency in some other point; and the Leicester tups were not such sure lamb getters, and the ewes were not so well disposed for impregnation, and the secretion of milk was not so abundant as in other breeds. When, however, the contest for the highest character as a tup-breeder, and the highest price for the letting of the tups, was somewhat passed over, and the Leicesters were submitted to the usual routine of sheep husbandry, they became better breeders and better nurses.

It was likewise, and not without reason, objected to them that their lambs were tender and weakly, and unable to bear the occasional inclemency of the weather at the lambing season. This also was a necessary consequence of that delicacy of form, and delicacy of constitution too, which were so sedulously cultivated in the Leicester sheep. The circumstance of their indisposition to accumulate fat internally was however much in their favour here. Had they "died as well," or, in plainer language, contained as much fat within as their external appearance bespoke, there would have been no room for the growth of the little one, and its puny form could not have endured the slightest hardship.

The last objection to the New Leicester sheep was the neglect and deficiency of the fleece; but this has already been hinted at. It was a great objection in the early history of the improved breed. The weight and quality of the fleece were not merely, as they should be, somewhat secondary considerations, but they were comparatively disregarded. There is little cause, however, for complaint at the present period. The wool has considerably increased in length, and has improved both in fineness and strength of fibre; it averages from 6 to 7 lbs. the fleece, and the fibre varies from five to more than twelve inches in length. It is mostly used in the manufacture of serges and carpets.

The principal value of the New Leicester breed consists in the improvement which it has effected in almost every variety of sheep that it has crossed. A rapid glance at the districts that have passed in review will afford satisfactory proof of this, as it regards the short-woolled breed. The Leicesters had nothing to do with the original formation of any of them, for each grew out of the situation in which it was placed: but they have formed useful and improved varieties with most of them, and in various instances a cross with them has superseded the native breed.

They had nothing to do with the formation of the South Downs, and the early crosses with them were not successful. The activity and the hardihood of the Sussex sheep were to a certain degree impaired, and the wool

was lengthened, weakened, and could no longer be used in the manufacture of cloth: but, when a complete revolution had taken place in the character and uses of the British short wools—when a finer and a better wool than the South Downs ever produced was brought into the market, and rapidly superseded that of British growth—when, in point of fact, the South Down wool was driven from all its old markets, and had to seek new and perfectly different ones, many farmers, reluctantly and hesitatingly at first, began to cross the South Down ewe with the Leicester ram. The consequence of this was, that although the South Downs lost some hardihood, as it regarded both keep and weather, they obtained a carcase not materially diminished in value in the estimation either of the consumer or the butcher—coming somewhat earlier to the market, and yielding a fleece longer in its staple, finer in its fibre, with much of its former strength, and feltiness too, and nearly doubled in weight—a true combing wool, valued by the manufacturer, having ready sale, and producing a fair remunerating price*.

Crosses between the New Leicester and the Dorset sheep have not been attempted on any extensive scale; but now that the middle wool finds so easy and profitable a market, the experiment will doubtless be resumed.

Still farther in the west the Leicesters have been eminently useful. Both the Dartmoor and the Exmoor sheep owe much to them, with respect to earlier maturity, increased size so far as it is desirable, and a far more valuable fleece. Mention will presently be made of the Devonshire Bampton sheep, a cross of the native sheep with the Leicesters, and now become scarcely inferior to the Leicesters themselves.

In Cornwall the Leicester blood has been introduced with decided advantage, not only in improving the sheep that were obtained from Dartmoor and Exmoor, but in imparting a better fleece and a better carcase to the native breed on the downs and heaths of the farther extremity of the county; and that, without seeming to diminish in any material degree the hardihood by means of which they are so well adapted to the situation which they occupy.

In Somersetshire, their influence may be traced in the Bamptons, extending from the borders of Devonshire to the river Parrett; and their form and character will not be overlooked in many of the flocks that wander on the Mendip Hills.

The cross of the Leicesters with the Ryelands has already been described. For a while it was of doubtful advantage—the carcase was enlarged, but the animal suffered in the fineness of the fleece and the flavour of the mutton. Now, however, that the Ryeland sheep has participated in the fate of all those of the short-woolled breed, and is no longer employed in the manufacture of fine cloth, the change produced in the fleece by the introduction of the Dishley blood is beneficial rather than injurious, as it better fits the wool for its new destiny, while it adds materially to the weight of the sheep. In the present state of sheep-husbandry and the employment of wool, a cross with the Leicester is advantageous to the farmer, as materially increasing his profit from both the carcase and the wool.

* This cross was early tried by Dr. Wilkins for another purpose. The situation of his farm was favourable to the sale of grass lambs. He reasoned that the disposition to fatten in the Leicester being greater than in the South Down, the lambs of the cross would go earlier to market than those of the pure South Down breed—that the same disposition to fatten would be extended to the ewes of the breeding stock; while the hardy constitution of the South Downs would enable the cross to live on less food than the pure Leicesters would require. The speculation seemed to succeed for a while, but was finally abandoned, because the best properties of these sheep were not brought fairly into play, or developed and improved by a cross for such a purpose.—*Agric. Mag. April*, 1803.

In the adjoining county of Worcester the Leicester sheep has also been at work, and profitably too, for the sheep farmer. In the north of the county the prevalent breed is composed of the grey-faced Shropshire and the Leicester; and, towards the centre and the south, of the Leicester and the Cotswold. This is likewise the character of all the Shropshire long-woolled sheep; while there is scarcely a short-woolled breed that has not now some of the Leicester blood in its veins. In Staffordshire the case is little different. Those crosses which were considered to be of doubtful advantage before the short wool was either deteriorated in itself, or driven from the market by German and Spanish fleeces, are now regarded in a different light. It was often a dubious question whether the enlargement of the carcase was not dearly purchased by the altered character of the fleece, but in Staffordshire, as elsewhere, the pasture suiting the sheep, a double advantage is now evidently gained, and the farmer is becoming more disposed to take advantage of it.

Into South Wales, and even to the farthest extremity of it, the Leicesters have penetrated, and generally with success; but they have met with powerful antagonists in the Cotswolds, that, or crosses from them, inhabit the fertile valleys with which the southern parts of the principality abound*.

In North Wales the Leicesters have been used with some but not uniform success in crossing the mountain breeds. Sir W. Bulkeley and Mr. Pritchard employed them with decided advantage in the Isle of Anglesey. In other places the improvement was not so evident. In fact, there seems so much contrariety in form and habit between the Leicester and the mountain sheep, that uniform or frequent success could scarcely be expected. The Cotswold sheep, although heavier than the Leicester, is more active and more patient both of cold and scanty food, and therefore more likely to produce a cross suited to such a country. The pure Leicesters were cultivated by some farmers, but they did not answer so well as crosses of them with the native breed; this was naturally to be expected.

In Lancashire, in Westmoreland, and in Cumberland, the native short-woolled sheep have been crossed by the Leicesters with much benefit.

In Northumberland the black-faced sheep are numerous, and it is the native county of the Cheviots; and from this district both breeds extend to the northern extremity of Scotland. The features of the country in an agricultural point of view are exceedingly different in various parts of Scotland, and the cattle and sheep that are bred in the different localities can possess but few qualities in common. The black-faced sheep can alone thrive, or even exist, on the heath and peat of the northern Highlands. The grassy and less exposed districts of this mountainous region will support a somewhat heavier sheep, and there and in the central Highlands the Cheviots are cultivated with advantage; while the valleys and plains, and they are numerous and fertile, will bear the larger Leicester breed.

It might, on first consideration, be questioned whether any cross was necessary between these,—whether the highland, or the upland, or the vale sheep could receive improvement by admixture with each other, and whether the only rational method of proceeding was not to keep the breeds pure and distinct, and improve them by careful selection alone.

* The reader will please to substitute the word "small" for "heavy" in page 267, line 33, of this work. Those who are acquainted with sheep well know that the Cotswold is larger and heavier than the Leicester. The Leicester was deemed to be too small, the Cotswold was substituted, and a cross was produced that was supposed to produce the desired change. The author is indebted to his kind friend Mr. Evan David of Radyr, for the discovery of this important, although apparently small, typographical error.

Sir John Sinclair has recorded his opinion on this point. "The Dishley breed is perhaps the best ever reared for a rich arable district; but the least tincture of this blood is destructive to the mountain sheep, as it makes them incapable of standing the least scarcity of food." Experience, however, has proved that both the highland and the upland sheep may be much improved by admixture with lowland blood; they may obtain the faculty of turning every particle of food to nutriment, and the early maturity, which constitute the value of the Leicester breed.

The breed itself cannot be changed. "I occupied a farm," says a Lammermuir sheep-master, "that had been rented by our family for nearly half a century. On entering it, the Cheviot stock was the object of our choice, and so long as we continued in possession of this breed every thing proceeded with considerable success; but the Dishley sheep came into fashion, and we, influenced by the general mania, cleared our farm of the Cheviots and procured the favourite stock. Our coarse lean pastures, however, were unequal to the task of supporting such heavy-bodied sheep; and they gradually dwindled away into less and less bulk: each generation was inferior to the preceding one; and, when the spring was severe, seldom more than two-thirds of the lambs could survive the ravages of the storm*." This was a sufficient illustration of the folly of placing certain breeds of sheep on situations which nature had not formed them to occupy; but it is another question whether there are not certain qualities belonging to sheep occupying a very different locality that may be advantageously imparted to other breeds.

The Cheviots occupy the upland districts—they are valuable in many particulars, but may they not obtain from another source a disposition to fatten more kindly and to arrive more early at maturity? They used to weigh from 17 to 20 lbs. per quarter, and to be ready for the market at three years old. They were crossed with the New Leicester sheep. They had sufficient inherent hardihood in them to thrive as well as ever on their native hills; they did not much increase in weight when they were in condition for the butcher, although some of them have been exhibited weighing 30 and 32 lbs. per quarter, but, on the same pasture, and stocked as closely as before, they arrived at maturity at less than two years old, and were frequently ready for the butcher at sixteen months. Nothing more needs to be stated in order to show their increased value, and that derived from the New Leicester cross. It is true that the wool underwent considerable change as well as the carcase. It was longer, heavier, and soon devoted to another purpose; but, before the revolution in the character and destiny of British wool the increased weight compensated for decrease of price, and, now that the middle wool is devoted to so many useful purposes, the farmer gains by the fleece as well as by the carcase.

The black-faced sheep seemed obstinately to resist the influence of foreign crosses. The Leicester, and even the Cheviot blood, added little to the value either of the fleece or of the carcase, while they materially lessened the hardihood of the sheep. Steam navigation, however, has been lately introduced. There are few parts of the Highlands which cannot to a greater or less degree profit by it; and it is now an object of new and rapidly increasing interest to prepare the lambs as early as possible for the country, or the metropolitan markets. For this they, formerly, were not ready until three or four years old. The Leicesters were now taken into

* On the Breeding, &c. of Cheviot and Black-faced Sheep, by a Lammermuir Farmer, p. 66.

requisition for this new purpose. The cast-off ewes of five or six years old were crossed with Leicester rams, and then retained on the farm, or sent to the Lothians, as suited the convenience of the owner. The lambs arrived at maturity before they were two years old, and were sold in the neighbourhood, or shipped for the London market. This system of sheep-farming soon became so profitable that on many farms—Lanarkshire will be a fair illustration of this—the whole of the stock was crossed with the Leicesters, the lambs sold, and ewe hogs regularly bought, in order to keep up the requisite number. These were the undeniable and important effects of crossing with the Leicester sheep.

Travelling rapidly southward, fresh illustrations of the changes effected present themselves in almost every county. The short-woolled sheep have become nearly extinct, or are essentially changed and improved. Even in Norfolk the aboriginal breed has almost disappeared. It has given way to the pure South Downs, or the Norfolk and the South Down, or the Norfolk and Leicester, or the pure South Down and the Leicester; and everywhere the fleece has undergone as much change as the sheep itself. It has ceased to be a carding wool; it is a valuable combing wool: and, could some of the causes of the depression of agriculture be removed, it would appear that, the weight of the sheep being increased, and the weight of the fleece also increased, the farmer actually derives a better remuneration from his flock than when his wool was short and fine, and of little weight, although it obtained a higher price.

The Leicesters bore a prominent part in the improvement of the fleece in the early period of the British Australian settlements. The first sheep were obtained from Bengal. They were a compound of almost every bad quality that a sheep could possess. Importations of the Leicesters and the South Downs were obtained as speedily as possible, and, by means of crosses with them, the fleeces of the Australian sheep were rendered almost as good and as valuable as the South Down and Leicester fleeces in England. It was not until some years after this that the Merinos began to be established in various parts of Europe, and that they reached those distant settlements, and found there a soil and climate so conducive to the development of their most valuable qualities.

The sheep that first inhabited the North American settlements were of the old Leicester breed. The improved Dishley breed were not long in finding their way across the Atlantic. The Merinos soon followed them; but, at the present moment, the Leicesters are acknowledged as the most widely diffused and most valuable breed. The West Indian and South American sheep are altogether of a different character.

The establishment and the flourishing state of the Leicester sheep in France have been already described in this work, at page 165.

The author of the present treatise has lately (October, 1836) had an opportunity of examining a considerable portion of this flock, remaining at Alfort under the care of Professor Yvart. The sheep appeared to him somewhat diminished in size, and in compactness too. It was longer, and it was thinner. It appeared to be housed and to be nursed a little too much. It was treated as if it were a Merino. The sterling excellence of the Dishley sheep was sacrificed in an attempt at rivalling a fleece to which its own bore no affinity. The improvement, however, which the Leicesters had already effected in the hornless long-woolled breeds along the coast, and throughout Normandy and Picardy, could not escape the observation of the traveller.

The other breeds of long-woolled sheep must now pass in review. The first

of them are found in Northumberland itself. Along the sea-coast, from North Durham southward, through the district called Bamburghshire, and extending below Alnwick, there has been a long-woolled breed of sheep from time immemorial. Although far from being a valuable sort, it possessed many good qualities, especially as contrasted with its neighbours, the *mugs*. Its countenance was open and its legs clean; it was well-formed, and its wool, although not so long as at present, was thick upon the pelt, and tolerably fine. It had been frequently crossed with the Lincolnshire breed, ere that sheep began to lose some of its good qualities. It had likewise mixed with the Teeswater, but obtained little advantage from that alliance except the questionable one of increase of size.

It was in 1767 that the Messrs. Culley entered upon the farm of Fenton, near Wooller, and in the immediate neighbourhood of these sheep. They were contemporaries of Mr. Bakewell. They had associated with him, and entered into all his views; and it was at this time that he was struggling with his principal difficulties. They brought with them some of his sheep, and, in the spirit of honourable rivalry, they strove to carry into effect the plans of Bakewell in the northern counties. After a long and severe struggle, their triumph was as signal and complete as that of their master.

Mr. Charge, of Newton, on the Yorkshire side of the Tees, had, previous to the arrival of the Messrs. Culley, brought Dishley tups to Morpeth, but he had not received much encouragement, nor had he let his rams for any great price. The Culleys were the first who set themselves down in the county, and publicly adopted this new plan of sheep-breeding. Mr. Thompson, then of East Lilburn, was one of the first who hired tups of them, and he continued constant in his adherence to them during several years: but various rivals began to enter the field, and among the foremost were Messrs. Cleaver and Kenal. They likewise professed to let tups for the improvement of the Northumberland breed, and they brought to Morpeth some which they had obtained at the edge of the Yorkshire Wolds, and which were deeply imbued with the Lincolnshire blood. They had large heads, large bones, and a great deal of curled, shaggy wool. Novelty, however, or the benefit expected to arise from such a complete cross, induced many to try this new kind of sheep; and, among the rest, Mr. Thompson began to cross the sheep of the Culleys with those of the new comers. The rage for these novel animals became so great, that the Messrs. Culley, instead of letting to the amount of 500*l.* or 600*l.*, did not receive 50*l.* during a whole year. Mr. Thompson soon discovered his mistake, and, although he had hired one of these Lincolnshire tups for two years, he would not use him the second season, but, candidly and honourably confessing his error, he returned to Fenton, and re-established his connection with the Culleys.

The other farmers of the neighbourhood soon became so convinced that the Lincolnshire tups were destroying every good point in their breed, that, when a new parcel of the intruders arrived at Morpeth, no one could be induced to hire them; and, after being driven about from fair to fair, they were sold at the price of two or three guineas each. This opposition was most serviceable to Messrs. Culley, and fully established the reputation of the Dishley breed. To them, and particularly to Mr. George Culley, must be awarded the honour of having effected that important change in the breeds of the northern sheep which Mr. Bakewell established in the midland counties. They both deserve well of posterity.

One of the celebrated sheep-fairs in Northumberland is St. Ninian's, about six miles from Wooller and twelve from Berwick: it is held at the

latter end of September. An account of this fair, in the year 1835, will give a satisfactory idea of the character of the Northumbrian sheep, and the present mode of management to a certain extent. The number of sheep were about 20,000, the most of which were draft-ewes. Three-fourths of the whole were Leicester draft-ewes, generally four years old, and of the best quality. They were almost all bought by dealers from Yorkshire, who drive them to the different markets in that county, or show them at their own homes, to be disposed of to the farmers as breeding-ewes. A lamb is taken from them in the next spring, and both lambs and ewes are fed in the following summer, and sold to the butcher. A few of them were purchased by the East Lothian farmers in order to produce early lambs for the Edinburgh markets. The remainder of the sheep shown were Leicester and half-bred shearlings, half-bred ewes, a few Cheviots, and about 100 Leicester rams. The half-breds are obtained by crossing Cheviot ewes with Leicester rams. The shearlings were bought by Morpeth dealers and by farmers to feed on turnips. The half-bred and Cheviot ewes were purchased for lambs in the neighbourhood, and the adjoining counties of Scotland. The Leicester rams were brought for sale and hire for the season. Some of them were sold or let as high as 10*l.* or 15*l.* each; but the current price for a good sheep was from 5*l.* to 8*l.* Some years ago much higher prices were given, but there are now so many breeders of fine Leicester rams in this part of the country, that prices are kept down by the competition*.

* Quarterly Journal of Agriculture, vol. v., p. 282.

The following account of the sheep-markets lately instituted in the neighbouring county of Berwickshire will further illustrate the state of the different breeds and the sheep management in the border counties. They are held at Dunse, a small town at the southern base of the Lammermuir hills, fourteen miles from Berwick, and ten from Coldstream.

The first market is held on the fourth Wednesday in March, principally for the sale of ewes in lamb, although several lots of hogs and wethers are brought in. The ewes are mostly of the Cheviot and black-faced breeds, from the Lammermuir hills, with a few Leicesters and half-bred ewes. They are purchased by the Berwickshire and East Lothian farmers and graziers. If there are any lots of fat sheep, they are bought by the Morpeth dealers.

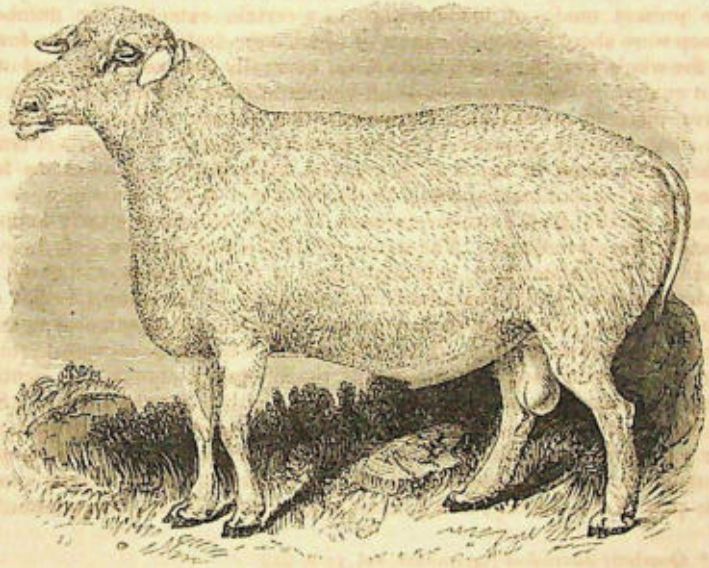
The second sheep-market is on the third Wednesday in May. Half the sheep consist of Leicester and half-bred hogs, and the other half of Cheviot hogs, Cheviot and black-faced wethers, black-faced ewes and lambs, and a few fat sheep. The greater part is purchased by farmers in the neighbourhood. Some of the Liecester hogs are nearly fat, and only require a few weeks' feeding after having been clipped.

The third market is on the second Wednesday in July, principally for the sale of lambs. Two-thirds of them are Leicester and half-bred, between the Leicester ram and the Cheviot, or black-faced ewe, and the remainder are Cheviot, or black-faced. The Leicesters and half-breds are purchased by farmers who keep no breeding stock: they are well turniped during the winter, and clipped and fattened in the following season. Some of the Cheviots and black-faced are bought for the same purpose; but most of them, if fat, are purchased by butchers and dealers, who give them an upland pasture, and keep them only in growing condition; for this kind of stock does not come so early to maturity as the Leicester.

This is also a great wool-market, and attended by most of the principal wool-staplers in Yorkshire; and more wool is bought and sold here than at any other market in the south of Scotland.

The fourth sheep-market is held on the fourth Wednesday in September. About 2000 are shown, consisting principally of draft-ewes, about two-thirds of which are Leicester and half-bred, and the remainder Cheviots and black-faced ewes, with a few wethers and fat sheep. The ewes are purchased by the neighbouring farmers and others, from East Lothian, who keep no breeding stock. Lambs are obtained from them, which are sold fat from the mother in May, June, and July. The ewe is immediately afterwards fattened and sold. It is considered to be a fair remuneration to get the lamb and the wool of the ewe for ten or twelve months' keep of the ewe. The average prices are about 25*s.* for Leicesters, 23*s.* for half-breds, and 20*s.* for Cheviots. Greater profits are often made by the East Lothian graziers, who force their lambs early

THE TEESWATER SHEEP.



The Teeswater Sheep.

This animal derives its name from the river that separates Durham from Yorkshire, and on the banks of which it was originally bred. The district that it occupied was a very confined one, and extended not much farther than the lowlands on either side of the river. It, doubtless, originally proceeded from the same stock as the old Lincolnshires, and, like them, it has passed away. It was a tall, clumsy animal, polled, and with white face and legs: the bones small compared with those of other large breeds, yet supporting a thicker, firmer, and heavier body than their size would indicate; wide upon the back, somewhat round in the barrel, and yielding a heavier carcase than any other sheep*, but proportionably longer in growing to perfection; the meat, however, was finer grained than could be expected from such an animal. The old Teeswaters had one valuable property to a very great extent; the ewes were exceedingly prolific. Mr. Culley records a singular case of this. Mr. Eddison had a ewe which at two years old, in 1772, brought him four lambs, five in 1773, two in 1774, and five in 1775, being sixteen in four years. On each of the two following years she bore twins. The wool of the Teeswater sheep was remarkably long and coarse, but thinly set upon the skin; the fleece of this large animal seldom weighing more than 9lbs.

Much inconvenience attended the keeping of a sheep of this sort. The pasture could not be heavily stocked with it, and there was a necessity for its being of a superior kind. It was on this account that the pastures on the banks of the Tees were so exceedingly and inconveniently small,

into the Edinburgh market; but considerable expense attends this mode of sheep-farming.—Quarterly Journ. of Agric., vol. v., p. 287.

* Mr. Hutchinson, of Stockton, had a Teeswater wether-sheep, which was killed at Darlington at Christmas, 1779. The four quarters weighed 17st. 11lbs., or 249lbs. being 62lbs. 4oz. per quarter, besides 17lbs. of loose fat.—Culley on Live Stock, p. 122.

in order that a few only of the sheep might be kept in each, and the grass not trodden down and destroyed. Even in that sheltered part of the country hay was given to them throughout the winter, and the ewes were supplied with corn for a considerable time after lambing.

Although the Teeswaters had their zealous advocates, they were some of the first to experience the beneficial effects of a cross with the Dishley sheep—a somewhat kindred breed, but possessing every good point in which the others were manifestly deficient. The consequence of this cross was a sudden and very considerable diminution of size. This at first somewhat alarmed the breeder, but he soon learned to appreciate the advantage of it. The carcase was smaller, but it was rounder and more compact, and the animal came to maturity earlier; so that considerably more sheep were kept and more mutton was produced on the same quantity of land than before. The Leicester mutton was not so delicately flavoured as the Teeswater, and yet the consequence of the cross was that the flesh of the Teeswater was evidently improved. The staple of the fleece was also shortened; but it was finer and closer, and a greater quantity of it grew on the same extent of surface. The wool, however, did not improve so rapidly as the carcase, and for a plain reason—that the Dishley sheep were at this time bred principally, or almost exclusively, with a view to quick fattening and early maturity. These were points which constituted the characteristic of the sheep, and were sure to be transmitted to the offspring. Any excellence of wool was accidental, and might, or might not, belong to the lamb. Therefore, many years after the Dishleys had established themselves on the banks of the Tees, although it was acknowledged that the wool was improved in the fineness of the fibre, and therefore was fit for other and for better manufactures, yet it was hard—it was diminished in toughness, and not always true. It was finer at the bottom of the staple than at the top, and the breech-wool was often as coarse and as hairy as before. The wool has now, however, received its due share of improvement, and the sheep from Durham or from York, or pasturing on the shores of the Tees, will yield to few varieties of the New Leicester blood.

As a proof of the tendency to early maturity which the cross had derived from their Leicestershire progenitors, so early as 1804, the following experiment by Mr. Mason of Chilton, whose reputation as a breeder stands deservedly high, is related:—On the 15th of August, he turned into good pasture, and fed in the usual way, four lambs of five months old. At the expiration of one year and two months he weighed them again, and found that each of them had gained, on the average, 114½ lbs., or at the rate of 1 lb. 15 oz. per week. This was a more than remunerating price for their food. He kept them to the autumn of the following year, when they were two years and seven months old. They had gained in this last year only 33 lbs. each, or not more than 10 oz. per week, which was far from being a remunerating price. This was an interesting and instructive experiment; not only showing the general disposition to fatness, but the age at which the increase of weight was most rapid, and the animal most profitable to the farmer.

The disgraceful breed of the Kentmore sheep, and all their crosses, are now supplanted by a better animal in the county of CUMBERLAND.

The original long-woolled breed of sheep that pastured on the lower grounds of WESTMORELAND have disappeared, and the Leicester or the Cheviot blood universally prevails.

In YORKSHIRE the long-woolled sheep may be considered as purely of

Leicester extraction, except that on the banks of the Humber, and to a less extent in the vale of Cleveland, there may be some portion of Lincoln blood. The old, large, coarse-boned, slow feeders, under the name of the Old Teeswaters, and a strange and inexplicable degeneration even of them, has vanished from the North Riding; and, where the pasture is suitable, the New Leicesters, in nearly their perfect purity, prevail.

THE LINCOLNSHIRE SHEEP.

It is asserted by some writers on husbandry, that the Lincolnshire sheep first reached England about the year 1760; but nothing can be so devoid of foundation. Ellis, who published his "Shepherd's Guide" in 1749, speaks of them as the established breed in the fens of Lincoln, and gives a description of them, which differs little from the accounts uniformly related by agriculturists, before they had been improved and altogether changed by the Dishley sheep. The country does not exist whence they could have been imported. The long-woolled sheep on the French coast are acknowledged to be of British origin; and the more valuable Flemish breeds owe many of their good qualities to a cross with the Kentish sheep. Instead of tracing their origin to so recent a date, it may with more reason be affirmed that they were the parents of the English long-woolled breeds. In the fens of Lincoln such an animal must in process of time have been formed, and thence would spread to other parts of the country. The Lincoln sheep, according to Ellis, who is the oldest agricultural writer in whom any description of them is found, were the "longest legged and largest carcased sheep of all others; and although their legs and bellies were for the most part void of wool, yet they carried more wool on them than any sheep whatsoever*."

Culley thus describes them towards the close of the last century:—"They have no horns, white faces, long, thin, and weak carcases; the ewes weighing from 14 lbs. to 20 lbs. per quarter; the three-year-old wethers, from 20 lbs. to 30 lbs. They have thick, rough, white legs, large bones, thick pelts, and long wool, from ten to eighteen inches, and weighing from 8 lbs. to 14 lbs. per fleece, and covering a slow-feeding, coarse-grained carcase of mutton †." A larger quantity of wool was clipped from the Lincolnshire sheep than from any other in the kingdom; and thence arose the error into which the Lincolnshire breeders fell: they bred for the fleece, and for the fleece alone. Bakewell neglected the fleece—the Lincolnshire farmer neglected the carcase; hence the opposite errors of each, and the reasonableness and advantage of the plan by which both the carcase and the fleece were at length brought to the highest degree of perfection. Culley, however, was a prejudiced man; he was a zealous disciple of Bakewell, and could with difficulty perceive any excellence in a rival breed.

If the Lincolnshire farmer too much neglected the carcase, there were times when the sheep, or when nature, would vindicate its claims. It is true that the form was gaunt and somewhat unsightly, but the excellence of the breed, as a grazing sheep, would occasionally appear. If the Lincoln would consume more food than the Leicester, it would increase in weight proportionably to the extra quantity of food which it ate; and this, together with the additional weight of wool, rendered it nearly or quite as profitable to the farmer. If the Lincolnshire breeder bestowed somewhat too much thought on the fleece, it should be recollected that these were the pastures which during five successive centuries

* Ellis's Shepherd's Guide, p. 44. † Culley on Live Stock, p. 111.

had fully supplied the looms of Norfolk, and, perhaps, with the exception of the Cotswolds—and their wool was of a different character—had yielded a fleece which no other part of the world could rival.

There was a long and acrimonious contest between the Leicesters and the Lincolns for the point of supremacy. In one respect the Lincolns were decidedly inferior—they were fen sheep—they were made for and by the kind of pasture on which they were found; and when they were removed even to good keep, but in a different district, and of a different description, they rapidly deteriorated. The Leicesters would thrive wherever they found a sufficiently nutritious pasturage.

The continuance however of the contest, and the doubt which even now exists in the minds of some with regard to the relative value of the respective breeds, show that the old Lincolnshire should not have been spoken of in so disparaging a way. Before they were allied to the Leicesters, and ill-formed and rough as they were, they had attained no small degree of excellence both in the carcase and the wool.

At length a union was established between them. The Lincolnshire ewe was put to the Leicester ram, and the progeny certainly displayed, and to a very great and profitable extent, the excellences of the male parent; the wether attained its maturity a full year sooner than it was accustomed to do, and with less comparative expense of food even in that time; and when the ewe was drafted, she too was sooner ready to be sent to the market, and weighed considerably more than she was wont to do, and was in higher repute and more readily sold.

Mr. Clarke of Canwick, in 1827, exhibited two wether sheep in Lincoln market, the fleeces of which had yielded 24 lbs. of wool. They were slaughtered—the carcase of the larger one weighed 261 lbs.; the fore quarters were, each of them 73 lbs., and the hind quarters 57½ lbs. On the top of the rib the solid fat measured nine inches in thickness. The weight of the smaller one was 250 lbs.*

* British Farmer's Mag., May, 1827. Mr. Dawson of Witheall, on 21st Sept. 1826, killed three more extraordinary sheep. The admeasurement of the heaviest is given at length.

William (Three Shear).

	Feet.	Inches.
Length from the top of the head to the tail	4	7
Breadth across the chine	2	2½
Girth behind the shoulders	6	1
From the top of the shoulders to the breast-end	2	7
Breadth across the rump	1	10¼
Round the rump from hip to hip	3	4
From the centre of the hip to the bottom of the flank	2	5
From the bosom point to the rump	5	6
Length of the face, from the crown to the nose	0	10½
Breadth from eye to eye	0	5½
Round the crag	1	10
Round the chop	1	0
From the knee to the fetlock	0	4
Thickness of the fore-leg under the knee	0	4½
From the hock to the fetlock	0	7
Thickness of the hind-leg	0	5
Height	2	8¼

Weight—27 stones (14 lbs.) 8 lbs., or 386 lbs.

Magnum Bonum (Two Shear).

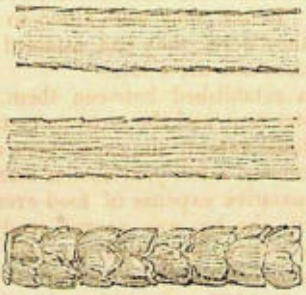
Weight—26 stones, or 364 lbs.

Height	2	9

Carcase

But the wool? These two fleeces weighed 24 lbs. There are instances of still greater weight: yet the fleece could not, on an average, be reckoned at more than 8 or 9 lbs. It has since become finer and the colour is improved, but it is shorter, a material objection in some fabrics, and it has lost some of that toughness which is an indispensable quality in the best combing wool. If these defects could be removed without bringing back the original coarseness, the fleece would indeed be improved as well as the carcase. The light and tender kind of wool is valuable in the manufacture of the rougher woollen articles, but it is not suited to the finer worsted fabrics.

In page 91 a delineation was given of the microscopic appearance of the Leicester wool; the reader is now presented with that of the Lincoln wool.



Lincoln Wool.

1. Gives a correct view of it as a transparent object. It is the 480th part of an inch in diameter, or a very little thicker than the pure Leicester: it is probable, however, that this is a very fine specimen of the Lincoln wool, and that there is generally more difference in the bulk of the fibre. There are 1280 serrations in the space of an inch; the Leicester presented 1860 serrations. In addition to this, the serrations are not so distinct as in the Leicester wool—they are superficial, irregular; they are like exceedingly short spines, lying upon, or rather within one another, and scarcely projecting from the fibre. They well mark the less degree of felting property possessed by the Lincoln wool, and explain why it is placed nearly at the bottom of the list, so far as the felting property is concerned. It will be interesting to the reader to compare this representation of the Lincoln wool, in which much feltiness would be an evil, with the South Down and the Merino (pp. 90 and 89), in the first of which, and in its uniform destination until the last few years, it was an advantage; and in the second, it was the most valuable property.

2. It is given as it appears when combed: a few of the serrations are disturbed; they are even made to appear somewhat prominent; but the majority of them are obliterated. They are fairly rubbed out. The worsted manufacturer knows how to take advantage of this.

3. The vegetable character of the fibre is here beautifully displayed, and the turning in of the leaves forming the cups,—they seem to present their rounded part instead of their edges. There cannot be much feltiness in such a fibre. There could not possibly have been a more satisfactory elucidation of the character and uses of the Leicester and Lin-

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Carcase K. (Shearling.)

	Feet.	Inches.
Weight—20 stone 4 lbs., or 284 lbs.		
Height	2	7

Kennedy and Grainger's Tenancy.

This record is important, not only as showing the weight to which the Lincolns, as they now are, crossed with the Leicesters, will attain, and the proportions of the animal, but also presenting another illustration of the period during which the sheep is profitable to the farmer. It is taken for granted that they were somewhat similar sheep. Between the first and second year the animal gains 80 lbs., a fair remuneration to the farmer—between the second and third years he gains but 22 lbs. He ought to have been sent earlier to the butcher, for he was not paying for his keep.

colnshire wools, and the reason why the wool of the Leicester and even of the cross between the Leicester and the Lincolnshire is not so useful in the manufacture of certain worsted goods, as that of the old Lincoln sheep.

The ingenious authors of the "Present State of the Tenancy of Land" give an account of the present management of Lincolnshire sheep. The sheep bred in the wolds are deeper crossed with the Leicesters than those on the marsh lands, which may account for the difference in the fleece*; it being much heavier and coarser on the marshes than on the wolds. The breed of sheep generally has been greatly increased since the introduction of the turnip system. The sheep bred in the wolds, and indeed in every part of the district where this system is pursued, are reared chiefly on artificial grasses. There are, however, great numbers bred on old pastures; but of these pastures, the best are kept for the purpose of fattening sheep.

The usual time for sheep-shearing is about the month of June; the washing taking place ten days previously. No ointment or grease is used after the shearing. The average weight of a fleece from the present sheep is about 7 lbs., (from the true Lincoln it would not be more than 9 lbs.,) and the length of the staple from eight to nine inches. The sheep are not kept in flocks, but in separate pastures, and are classed according to their different sorts, and the respective qualities of the pastures. They have their first lamb when about two years old, in March or April.

Of the returns from a sheep farm, the fleece is estimated at about one-fourth, or between a third and a fourth; but this depends upon the state of the markets at different periods; the prices both of the wool and the carcase greatly varying. The prices which are considered as remunerating ones, are for the wool 30*s.* per tod, for two year-old wethers 52*s.*; for one year-old 35*s.*; for ewes 27*s.*; and for lambs 21*s.*†

Skirting the eastern coast, there are no long-woolled sheep deserving of notice until the Kentish marshes are approached, and there a valuable breed presents itself—the

ROMNEY MARSH SHEEP.

Romney Marsh is an extensive tract of land recovered from the sea in a very early period of English history. In the year 1350 the laws for the preservation of it are called ancient and approved customs. There is some poor sandy soil in various parts of it, but the greater portion consists of fine rich pasture never turned up by the plough, on which sheep are bred and fattened; and for the improvement of which, in many parts, no other means are employed than what are derived from the sheep and cattle with which it is stocked. A long-woolled and highly valuable breed of sheep has been kept on Romney Marsh from time immemorial, and until within a very few years they have undergone little change.

Mr. Price, occupying a farm on the edge of the Marsh, gives the following description of the Kentish sheep thirty years ago:—"The pure Romney Marsh-bred sheep are distinguished by thickness and length of head, a broad forehead with a tuft of wool upon it, a long and thick neck and carcase. They are flat-sided, have a sharp chine, are tolerably wide on the loin, have the breast narrow and not deep, and the fore-quarter not heavy nor full. The thigh full and broad, the belly large and tabby, the tail thick, long, and coarse; the legs thick with large feet; the muscle coarse and the bone large; the wool long and not fine, and coarsest on

* Kennedy and Grainger on the present State of the Tenancy, vol. ii. p. 158.
† Ibid.

the breast; they have much internal fat, and are great favourites with the butcher. They have much hardihood; they bear their cold and exposed situation well, and they require no artificial food during the hardest winter, except a little hay. The wethers seldom reach the market until they are three years old—they then weigh from ten to twelve stones (14 lbs.), and the ewes from nine stones to eleven*." The average weight of the fleece was 6½ or 7 lbs.; the wool was tolerably fine and long and of a good colour, and more than 20 lbs. weight used to be produced on each acre of marsh land. It was useful in some of our own finest goods, and the Flemish and the foreign market generally were principally supplied by it.

It will be readily acknowledged that there were many good points about this sheep, and that it was a most valuable breed for the situation in which it was placed, and the purposes for which it was reared. It demanded a pasture of unusual richness, and found it on these marshes. The produce in wool, and the thickness in stocking, were scarcely equalled in any other breed or situation. It was not unusual for six or seven tegs and seven or eight fattening wethers to be placed on one acre.

However valuable the old Romney sheep might be, there were many points which a sheep-breeder would wish to be rectified; and, although later than in most other parts of the kingdom, the Leicester sheep found their way into Kent. The Kentish men obstinately resisted every encroachment on their favourite breed, and predicted disappointment and loss in all possible varieties of form. For a while it seemed as if they had reason on their side, for the size of the sheep was considerably lessened, and the wool was not so valuable nor yielded in its former quantity. By degrees, however, it began to be found, that these smaller, deeper, closer, and more compact sheep weighed heavier than the old long-legged and long-bodied ones—that they did not consume so much food, and that the hard stocking of former days might be increased—that they were ready a full year sooner for the market, and therefore became far more profitable—that the fat began to form more on the exterior of the animal, where it was most advantageously placed for the farmer and the consumer, and did not accumulate within for the profit of the butcher alone; and that, by careful selection, although the wool was somewhat shorter and lighter, and weaker, it was improved in fineness, in colour, and in felting property where that was wanted. There can be no doubt that the old breed of sheep was materially improved.

The pure Leicester would not be sufficiently hardy for the marsh lands, nor would their progeny preserve all their good qualities when exposed to cold and privations to which they had not been accustomed. They would rapidly degenerate, and become the bony and coarse animals which such a situation would almost necessarily produce; but they would effect some valuable service in producing greater depth and roundness, and symmetry of form, and, connected with these, earlier maturity and greater propensity to fatten. This they have done, and the advantage is retained among judicious sheep-owners, by occasional recourse to the breed whence the improvement was derived;—occasional recourse—for it is easy to introduce too much of the Leicester blood, and to make the progeny too tender for the bleak and exposed pastures of the marsh. In Lincolnshire, the Leicesters might be suffered, not merely to mingle with, but to preponderate over the native breed. In the Teeswater and the Cotswold this preponderance would be manifestly advantageous, but although compactness and early maturity might be imparted to the Romney Marsh by the influence of the

* Price on Sheep, p. 109.

Leicester cross, care should be taken that the sterling properties of the native sheep are not impaired, or destroyed by too frequent recourse to foreign blood.



Kentish Sheep.

The full stocking of the sheep on the Marsh, and long-established custom, have induced the Romney breeders to send their lambs to the farmers in the uplands to be kept during the winter. They are first turned on the stubbles, and if they were earlier shifted to the pastures they might do well; but generally they are not removed until the weakly part of the flock is materially injured. Being removed, those which have escaped the probable mischief from a too long delay in the stubbles, thrive and grow in a very satisfactory way; but the weakly ones experience still farther mischief from this change, for their digestive organs are too debilitated to bear the stimulus of the increased and more nutritive food. When the winter comes on and the young stock begin to be pinched by the cold, and the pastures are become bare or trampled down, it is a cruel and destructive practice to deny them a little hay; the additional expense would not be much, and the diminished number of deaths, and the power of keeping a much larger stock, would abundantly repay the extra trouble and outlay.

Formerly the ewe-flocks on the Marsh were even more cruelly abandoned than the youngsters on the uplands. In the severest weather, when the stale herbage, their only food, was deeply buried beneath the snow, and cutting winds set in upon them from the sea, and they were destitute of food and shelter, thousands have been destroyed in the course of the winter. Many have been lost in the fence dykes, especially when there was ice of sufficient strength to bear the snow, but not the sheep. When the ice would everywhere bear the flocks, the marsh became one widely-spread common, and it would have been folly to have attempted to afford relief, even if each individual could find and separate his own flock*.

* Marshall's Southern Counties, vol. i. p. 378.

The fatal effects of the cold easterly winds to which these marshes are so much exposed are peculiarly evident in lambing time. There are few buildings for the reception of the ewes at that period; few hedges; scarcely a few hurdles to break the force of the wind: but it is one vast unsheltered level. The blast blows keenly and the sleet falls, and in some severe nights almost every lamb that drops is destroyed. If they could be placed under some sheltering roof, however rude—if there were even a hedge to shield them from the blast, they would be saved. These are now found in some spots, and no farmer whose humanity or regard to his own profit has induced him to contrive them, has ever had reason to regret the expense. The simple placing of brush-fagots, fastened to the ground by small stakes, along the sides of the ditches, will afford shelter to the lambs and ewes that couch close beside them: they will be attended with no greater expense than carrying them thither and taking them away when the season has passed, and many hundred lambs that used occasionally to be drowned in the marsh ditches in the course of one stormy night will be saved. The better way, however, where it is practicable, is to have a well-fenced field, and perhaps with a small building within it, for the reception of those that may be weakly or their yeaning difficult*. The time is not far distant when it will be more generally acknowledged that one of the most important and pleasing and profitable divisions of agricultural science and practice, consists in attention to the comfort of the animals of which the farmer's stock is composed.

Continuing to skirt the southern and western coasts, no distinct breeds of native long-woolled sheep present themselves, between Kent and Devonshire. In the latter county there are three distinct breeds; or at least so far different in their character and locality as to deserve distinct notice.

THE SOUTH-HAM NOTTS.

These sheep inhabit the southern part of Devonshire from Axminster, or the vale of Honiton, almost to the borders of Dartmoor. Their early history cannot be distinctly traced; but they bear so close a resemblance to the Romney Marsh sheep, that the conclusion is almost inevitable that they have the same origin. They differed, however, from the Kentish sheep in having brown faces and legs. The South Ham sheep had the same crooked back, flat side, and coarse bone. They carried a long-woolled fleece of somewhat loose fibre, and from 9 lbs. to 10 lbs. in weight. At thirty months old they averaged 22 lbs. per quarter of well-flavoured mutton. They were crossed by the Leicesters as soon as these sheep had penetrated so far westward; and although here as elsewhere the native breed was somewhat diminished in size, and the fleece lessened in weight, a better form was given to the animal, and a greater disposition to fatten, and at an earlier period. The brown stain was likewise removed, and the white countenance of the long-woolled sheep restored or imparted.

THE BAMPTON SHEEP.

These inhabit the lower and good pasture-land of the north of Devonshire, and extend to the vale of Taunton, and far into Somersetshire. They derive their name from a village on the borders of the two counties, where they are supposed to have been first bred. An early agricultural writer gives the following account of them:—"They are the best breed in Devonshire, and have existed in the neighbourhood of Bampton from time immemorial. A fat ewe of that breed rises to 20 lbs. a quarter on an average, and wethers

* Price on Sheep, p. 118.

to 30 lbs. or 35 lbs. a quarter at two years old. They are white-faced; the best breed living, more like the Leicestershire than any other, but larger boned, and longer in the legs and the body, yet not so long as the Wiltshires, by which they have been crossed,—nor so broad-backed as the Leicesters. Eighteen pounds of wool have been shorn from a ram of this breed that was supposed to be 40 lbs. the quarter. The carcase is coarser than that of the Dorsets, and the wool about 2*d*. per pound cheaper. This breed, I should conceive, may be greatly improved by crossing with the New Leicesters*."

It has been crossed with the New Leicester, and with evident advantage, although the usual complaints were loudly and pertinaciously made, that the carcase was unprofitably diminished, and the wool lessened in weight and length, and toughness, and the lambs more tender and difficult to rear. These prejudices have gradually subsided, and the Bamptons now contain far more of the Leicester than of the old Nott blood, and bear the closest possible resemblance to the Leicesters. They are ready for the butcher at twenty months old, weighing 20 lbs. or 22 lbs. the quarter, and yielding, on an average, 8 lbs. of wool.

With whatever truth it may be said that some of the Devonshire long-woolled sheep, and the Bamptons among the number, were originally derived from the Western Downs, and from ancestors that were short, or at least middle-woolled, they are now properly long-woolled sheep, and of a very valuable description.

THE EXMOOR NOTTS

have been described as a kind of middle-woolled sheep; but those that have been deeply crossed with the Leicester rams have not only increased in weight and kindly disposition, but in length of fleece. Many of them may at present be said to be a small sort of long-woolled sheep—the fleece frequently weighing 4½ lbs. of washed wool, and the sheep, on the kind of ground which it occupies, being mostly kept for the profit yielded by the fleece.

THE COTSWOLD SHEEP.

If thy farm extends
Near Cotswold Downs————
Regard this sort, and hence thy sire of lambs select.—Dyer's Fleece, Book I.

They are so called, according to Camden, from the cots or sheds in which they were housed either at night, or permanently, in the winter; and the wolds, or open hilly grounds, on which they were pastured in the summer. This mode of protecting the sheep from the inclemency of the weather seems to have been, in some former period, generally practised in the contiguous counties of Gloucestershire, Herefordshire, and Worcestershire. It was not always a very rude kind of protection that was thus afforded; for Camden goes on to say, that these cots were long ranges of buildings, three or four stories high, with low ceilings, and with a slope at one end of each floor, reaching to the next, and by which the sheep were enabled to ascend to the topmost one.

The Cotswold sheep have been held in high estimation from a very early period of history. Drayton, who flourished in the time of Henry VIII.,

* Annals of Agriculture, vol. xvii., p. 300.

represents in one of his singular, but still beautiful poems, Cotswold as King of the Shepherds, and thus speaks of him,—

> " T' whom Sarum's plaine gives place, though famous for its flocks,
> Yet hardly doth she tythe our Cotswold's wealthy locks;
> Tho' Leinster * him exceed in fineness of her ore,
> Yet quite he puts her down for his abundant store."

It has already been stated (page 211) that in 1437 Don Duarte, king of Portugal, and brother-in-law to the king of Castile, from whom he might have obtained the finest of the short Spanish wool, made application to Henry VI. for liberty to export sixty sacks of Cotswold wool, in order that he might manufacture certain cloths of gold at Florence for his own use.

Stowe, in his " Chronicle," under the year 1467, twenty-seven years after the exportation of this wool, has the following passage :—" Shepe transported into Spain.—In this yere King Edward IV. gave a license to pass over certain Cotswold shepe into Spain, by reason whereof it has come to pass at this day, that the staple of the wools of Spain, except at Baydes (Bruges) in Flanders, is so great, that our staple is not comparable to it."

With the exception of Anderson, and Lawrence, and Dickson, the nature of these regal presents is well understood and explained. They were long wools and long-woolled sheep that were sent to Spain, not designed to mingle with and improve the wool, or the breed of the migratory sheep of Spain, but to form a lighter serge-like fabric. The greater part, or the whole of the wool that was exported from Great Britain at that time, and for centuries before, was long wool, and the Cotswold sheep were then, as now, long-woolled. Stowe is in manifest error when he attributes any change in the breed of Spanish sheep to the animals thus exported.

In the year 1390 no fewer than 130,000 sacks of wool were exported from the different ports of Great Britain. This, reckoning 364 lbs. to the sack, would amount to 47,320,000 lbs. of wool. Where were the number of short-woolled sheep to be found that would supply this immense quantity of wool, besides that which was required for the home manufacture? The fleece of the short-woolled sheep would scarcely average more than 2½ lbs.; and consequently the number of sheep which then covered our pastures must have been nearly 19,000,000, exclusive of those that were to supply the home manufacture. The whole number of sheep in England and Wales, according to Mr. Luccock's calculation, was but 26,000,000 in 1800. In 1741 it was but 17,000,000; and in 1698 they were calculated by Gregory King to be only 12,000,000. Nothing more needs to be stated in order to prove that they were long-woolled sheep that yielded this immense quantity of exported wool; and reckoning 7 lbs. to be the average weight of the fleece, 6,760,000 sheep would be requisite: still an immense number, and showing how decidedly the English people were, at that time, growers of sheep. It is requisite only to add that Markham, a writer on agricultural affairs in the time of Queen Elizabeth, says that the Cotswold sheep were, as they continued in every period of their early history, " a long-woolled and large-boned breed†."

* The Leinster, or Leominster ore, to which the poet here alludes—wool as precious as ore—was at that time finer than the Cotswold, as it is at the present period the finest in England.—*Vide* Annals of Agriculture, vol. xv., p. 455.

† After all these historical notices, it is really unaccountable to find such otherwise excellent writers as Mr. Herbert and others, gravely tell the public that " the first of the

Very few flocks of pure Cotswolds now exist, and these are rapidly diminishing. They are taller and longer than the improved breed, comparatively flat-sided, deficient in the fore-quarter, but full in the hind-quarter; not fattening so early, but yielding a longer and heavier fleece. There can be no doubt that the Cotswolds have been materially improved by an infusion of the Leicester blood; and in the same way as in the other long-woolled breeds. The degree to which the cross may be carried must depend on the nature of the old stock, and on the situation and character of the farm. In exposed situations, and somewhat scanty pasture, the old blood should decidedly prevail. On a more sheltered soil, and on land that will bear closer stocking, a greater use may be made of the Leicester. Another circumstance that will guide the farmer is the object that he principally has in view. If he expects to derive his chief profit from the wool, he will look to the primitive Cotswolds; if he expects to gain more as a grazier, he will use the Leicester ram more freely. In the latter case he will have a smaller sheep, but one that will yield as much or more weight of carcase than his taller competitor, and more of which may be kept on the same space of ground.

It is curious to observe the different size and appearance of sheep, essentially the same, in different parts of Worcestershire and Gloucester, and often on the same farm after the lapse of a few years. Caprice or fashion produces strange alterations in sheep stock. The prevalent breed may be said to consist of half Cotswold and half Leicester. The farmer, perhaps, finds his sheep to diminish in size more rapidly than he likes; he has not the same weight of wool; he fancies that the constitution of his flock is becoming delicate, and that he has not the number of lambs which he had a right to expect. He buys or he hires a Cotswold ram, and these defects are immediately remedied. He breeds on with the Cotswold, and his sheep are not brought quite so early to the market, and they are becoming too large for the quality of his land, and he goes again to the Leicester ram. It is in this alternate play between the two breeds, that the business and the skill of the sheep-master here consist. The tide of opinion is now prevailing in favour of the smaller breed of sheep, and the Leicesters are much in requisition. The land suiting his purpose, he is wise who will content himself with this smaller breed, so many more of which he can have upon his land, and which he can bring to the market so much sooner.

The two-year old wether of the improved sort, and consisting of half Cotswold and half Leicester, will weigh from 20 to more than 40 lbs. per quarter, and yield 7 or 8 lbs. of wool per fleece.

old Lincolnshire and Leicestershire breeds reached England about the year 1760; six or seven years after which, Mr. Turner introduced into Herefordshire a cross between the Leicester ewe and the small Ryeland ram; whence the origin of the Cotswold or large Herefordshire breed."—British Farmer's Magazine, Nov. 1830, p. 440.

It is also singular to find Lawrence and Dickson, and the whole herd of compilers, describe the thorough change from short to long-woolled sheep which has taken place within the last forty or fifty years on the Cotswold hills. Mr. Marshall says that he made every inquiry on the subject when he visited this part of the kingdom, and had opportunity of conversing with some of the oldest and most intelligent farmers and shepherds; and he could come no nearer to the probability of the breed having formerly been a short-woolled one, than the circumstance that the inclosures had done in Gloucestershire what they had done in every other district, increased the carcase and lengthened the wool of the sheep.—Marshall's Western Agriculture, p. 8.

The writer of the present treatise begs leave fully to confirm Mr. Marshall's account. He tried in vain to obtain intelligence of this former fine short-woolled breed. Changed only with the change of sheep-farming, the Cotswold sheep are what they have been from time immemorial.

Dr. Dickson states that in Devonshire they have succeeded in the cross of the New Leicester upon the Cotswold: wethers of eighteen months, averaging 19 lbs. the quarter, and giving 7 lbs. of unwashed wool; and at thirty months weighing 25 lbs. the quarter, with an unusual quantity of inside fat,—the fleece weighing 9 lbs., and being a penny a pound better than that of the Exmoor, Bampton, or South Devon. The writer of the present treatise has not seen any of these sheep, but he can readily subscribe to the opinion of Dr. Dickson, that "in this breed, which is large and heavy in the carcase, and full in the fleece, with a degree of fineness, there is the combination of a good and useful form that greatly suits the general demand*."

THE MIDLAND LONG-WOOLLED SHEEP.

The description given of the old Leicester sheep in page 314 will apply with little alteration to those of all the midland counties. It was a caricature which Mr. Marshall gave of them, when he describes the old Warwickshire ram as having "a frame large and remarkably loose; his bone heavy, his legs long and thick, terminating in great splaw feet; his chine as well as his rump sharp as a hatchet, his skin rattling on his ribs, and his handle resembling that of a skeleton wrapped in parchment." Husbandry had not in those days assumed the form of a science: it comprised one principle alone, namely, to pursue, with the least possible variation, the system of their forefathers; and a great deal of money and good pasture were wasted on animals which ill repaid the care that was bestowed upon them. When however the Dishley sheep was moulded by the master hand of Bakewell, the ill-formed and unprofitable animals that had existed from time immemorial began speedily to disappear. In some districts they were given up at once, and the sheep of Bakewell substituted; but by more, and perhaps eventually with equal or better judgment, the old stock was crossed and recrossed by the Dishley ram until it was made up of the New Leicester blood, or only so much of the old leaven was left as would naturalize the new comer, make him a part and portion of the soil, and secure to him that hardihood which many of the situations in which he afterwards might be placed would require. In the other districts that have passed in review, the New Leicester improved the native breed, to a greater or less degree, yet always essentially; but in the midland counties he completely superseded the native flock. The old sheep has altogether vanished; and from the north of Derby and of Nottingham to the south of Oxford, there is now but one breed of long-woolled sheep.

The management is essentially the same everywhere; it therefore can only be necessary for the author to transcribe the substance of a communication from his old and excellent friend Mr. Mayer, of Newcastle-under-Lyme, describing the management of the Leicester sheep in Staffordshire, in order to give the reader a sufficient idea of the present state of the breed, and of sheep husbandry generally, in all the midland counties.

He describes the Leicester in his neighbourhood as a quiet, large-bodied sheep, fine and light in the bone, thick and plump in the carcase, broad across the loin, with the back-bone well covered, not rising into a ridge, but sinking into a channel which runs from the withers to the rump, fine and clean in the neck and shoulders, and not too short in the leg. Weighing, at a year old, from 15 to 20 lbs. a quarter; the hind quarters good; the fore quarters heavy and full. From eighteen months to two years old,

* Dickson's Complete System of Improved Live Stock Management, vol. i. p. 365.

the ewes weighing from 20 to 25 lbs. a quarter, and the wethers from 24 to 28 lbs.; and, after that, some select sheep weighing 40 and 50 lbs. a quarter, and even more. The ewe fleeces weighing about 6 or 7 lbs., and that of the rams and wethers from 8 to 10 lbs. while they are yearlings, the fibre from 6 to 7 inches in length and of excellent quality. The wools being used in the manufacture of stuff goods, such as shalloons, camlets, moreens, bombasins, &c.: a large quantity of it being also made into what is called horse millinery, consisting of girths, fringes, and other articles of use or ornament, either in horse or carriage equipage, and the coarser wool being converted into warps for carpets, &c. The wool having been much improved within the last twenty years, both in length and fineness of staple, in consequence of the breeders being more choice in the selection of the rams employed; greater care being also taken to keep up the condition and health of the sheep during the inclemency of the winter; and therefore the break in the fibre which occasionally interfered so much with the value of the wool, and the purposes for which it is employed, being now rarely seen.

The Leicester ewes, although they do not bring so many lambs, nor rear them so certainly, nor make them so fat as sheep of a more hardy description do, yet have very much improved in these respects, and actually rear from 110 to 120 lambs from every 100 ewes; the ewes that are barren being mostly fit for the butcher, and those that lose their lambs getting fat in much less time than any other breed. On account of this promptitude to fatten, the Leicesters are brought into the market, and average as much per quarter at one year old as those of most other breeds do at two and three; the farmer also having the power to stock harder and closer with them than with any others of equal weight, as they are always in good condition, even when suckling lambs, or hard kept. The ewes will not fatten their lambs for the butcher; but this is no eventual loss to the farmer, as lambs of this breed are much better kept on for mutton and wool, and it would be a public detriment to slaughter them prematurely.

Some farmers, however, finding a great and steady demand for lamb as well as for mutton, have been induced to keep an annual stock of sheep, consisting only of ewes and wethers bought in at Michaelmas, principally of the Cheviot and Anglesey breeds. The ewes are immediately put to a Leicestershire ram. The lambs are fattened and sold in June or July, and the ewes are afterwards fed on clover grass, and sold in October or November. The Cheviots are good sucklers and generally make fat lambs, averaging about 15 lbs. the quarter, while from 3 to 4 lbs. of wool are cut from each.

The wethers are of the same kind, and are bought about May or June, from one to four years old. They are fed on clover or grass, and mostly sold in the autumn, averaging about 16 lbs. the quarter, and yielding from 3½ to 4½ lbs. of wool. Sometimes they are kept on until the following spring and fed upon turnips; but being of a restless disposition, they seldom increase more in weight than from 2 to 3 lbs. per quarter, from October to March.

The Leicester ewes are put to the ram at the beginning or middle of October, and taken from him again about the second week in November. One ram will serve from 60 to 70 ewes, but if he is kept in a close, and a teaser employed, he will serve from 80 to 100. He is raddled at the time that he is put to the ewes, and those which are served are taken from him once a week and numbered. They are then put to another ram that has been blackened, in order to distinguish the ewes that are served again. These are likewise drawn every week and marked with a different number. This precaution will save much trouble when they are drawn for lambing, which ought always to be done.

The ewes will approach their time of yeaning about the beginning or middle of March; and this being often an inclement season, and the Leicesters requiring more attention than the hardier kind of sheep, the ewes that are coming to the last week of pregnancy should be separated from the others according to their numbers, and brought nearer home, that they may be put into a yard at night, constructed for this purpose, having a good shed in it, and being well protected from the cold wind. They should have a plentiful supply of turnips, ox-cabbage, &c. The greatest attention should be paid to them at this time, and the shepherd should be with them as much as his other duties will permit. If it is a peculiarly valuable flock, the shepherd should sleep on the premises, for the Leicester ewes are more liable to require assistance when yeaning than any other sheep are. The lambs are generally large, and the ewes very fat, and so a double difficulty occurs.

The lambs are kept up for a few nights, leaving them out with the mothers in the day-time. They should be castrated when about a fortnight old; but a fine and dry day should be selected, and they should be kept up for two or three nights afterwards. They should likewise be tailed at the same time. The lambs remain with their mothers until the beginning or middle of July; they are then weaned and turned into good pasture of seeds or grass, until the latter end of October, when they are put upon turnips,—sometimes the common turnips first, and afterwards the Swedes; but they do better upon turf, provided it is to be had—a few turnips being drawn when the weather is severe. The ewes remain on the ordinary pasture, which probably will bear from seven to eight per acre, until within three weeks of their being put to the ram, when they should be changed into good pasture, which will cause them to flower sooner and more regularly. The ewes continue on the old pastures until the end of November, from the time the rams are taken away, when they are sometimes hurdled upon turnips, the fat sheep having been penned upon them first, and the ewes following to make clean work.

The lambs are seldom shorn until the second year, when the fleece will weigh between 7 and 8 lbs., the length of the staple being from ten to twelve inches. The aged ewes yield from 5½ to 6 lbs. of wool. The usual time of shearing the store sheep is from the beginning to the middle or end of June; sometimes, however, they are shorn in May, and yield from 7 to 9 lbs. of wool. The washing usually takes place in the last week in May; after which the sheep are sent into clean pastures for a week or a fortnight before they are shorn. Some farmers permit a longer time to elapse in order to allow the yolk to rise into the wool; this makes it weigh heavier, and also work better in the manufacturing process. The yearling wethers are generally separated from the theaves at the time of shearing, and they are put upon good keep, and most frequently upon seeds. The theaves run upon the common pasture until the ewes go to better keep, previous to their being sent to the ram. The wethers are generally kept on turnips, and sold in the early part of the following spring. On large and well-conducted farms they have a rack in the field, well supplied with coarse hay or straw, and a trough is fixed under the rack containing common or rock salt. The system of folding is rarely adopted where the New Leicester sheep are kept: neither the nature of the sheep nor the size of the farms will often allow it.

No apology is made for the insertion of this simple, intelligible, and complete system of long-woolled sheep-husbandry: it should, however, be stated that it more accurately describes the course pursued by the large than the small farmer.

Number of Sheep and Quantity of Sheep's Wool produced in England, according to Mr. Luccock's Tables, revised by Mr. Hubbard, and made applicable to 1828.

COUNTY.	1800. Number of Short Wool Sheep.	1800. Weight of Fleece.	1800. Number of Packs.	1800. Number of Long Wool Sheep.	1828. Number of Packs.	1828. Weight of Fleece.	1828. Number of Packs of Short Wool.	1828. Number of Packs of Long Wool.
Northumberland	538,162	5½	12,333	..	..	5½	6,167	6,166
Durham	159,385	5	3,320	..	..	5¾	..	3,818
Ditto	..	9	..	67,200	2,520	8½	..	2,380
Cumberland	378,400	3¾	5,915	..	..	5	7,883	..
Westmoreland	223,725	3½	3,262	..	..	5	4,660	..
Yorksh. W. Riding.	383,122	var	6,678	..	..	5½	4,390	4,389
—— East Riding	306,240	5	6,380	..	..	6	..	7,656
—— N. Riding	365,326	var	5,939	..	..	5	5,708	1,902
Holderness	..	8	..	84,000	2,800	8	..	2,800
Other parts of Yorks.	..	8	..	14,310	477	8	..	477
Lancaster	310,000	3½	4,522	..	..	4½	5,812	..
Chester	65,000	var	926	..	..	4½	1,218	..
Derby	362,400	3	4,530	..	..	6	..	9,060
Nottingham	255,147	var	4,112	..	..	6½	..	6,910
Lincoln	123,648	5½	2,833	..	..	6	..	3,091
—— rich land	..	9	..	1,241,625	46,561	9	..	46,561
—— marshes	..	8	..	87,500	2,916	9	..	3,281
—— miscell. land	..	8	..	505,657	16,855	6	..	12,641
Rutland	..	5	..	114,000	2,370	6	..	2,850
Northampton	..	6	..	640,000	16,000	6	..	16,000
Warwick	182,962	3	2,287	..	..	6	..	8,574
Ditto	..	5	..	160,000	3,333			
Leicester	20,000	3½	291	..	..	6	..	10,013
Ditto	..	7	..	380,528	11,100			
Oxford	304,584	var	5,303	..	..	5	..	6,345
Bucks	222,968	3	2,787	..	..	5	..	4,645
Gloucester	355,000	var	5,400	..	..	6	..	8,875
Ditto	..	8	..	200,000	6,666	8	..	6,666
Somerset	500,700	4½	9,388	..	..	5	5,215	5,216
Worcester	330,504	3½	4,820	..	..	4¾	..	6,541
Monmouth	177,619	var	1,431	..	..	4	..	2,960
Hereford	500,000	2	4,200	..	..	4	2,778	5,555
Shropshire	422,034	2½	4,397	..	..	4	2,344	4,960
Stafford	183,120	2	1,526	..	..	4½	..	3,503
Ditto	..	7	..	3,720	113			
Bedford	204,000	5	4,250	..	..	5	..	4,250
Berks	306,600	3½	4,151	..	..	3½	4,471	..
Huntingdon	108,000	4½	2,000	..	..	5½	..	4,480
Ditto	..	7	..	87,500	2,552			
Cambridge	67,744	4	1,128	..	..	4½	1,270	..
Ditto	..	8	..	41,688	1,390	8	..	1,390
Suffolk	497,000	2½	5,176	..	..	4½	8,801	..
Norfolk	683,704	2	5,697	..	..	4½	4,273	8,546
Ditto	..	7	..	38,500	1,123	7½	..	1,203
Essex	519,000	3	6,486	..	..	4	8,650	..
Hertford	277,000	4½	5,297	..	..	5	2,885	2,885
Middlesex	45,000	4	750	..	..	5	937	..
Kent	521,475	3¼	7,000	..	..	4¾	..	10,380
—— Romney mkt.	..	7	..	185,000	5,400	6½	..	5,010
—— the Marsh	..	7	..	108,230	3,160	6½	..	2,934
Surrey	283,000	3	3,540	..	..	3½	4,127	..
Sussex	316,800	2	2,540	..	..	3	3,960	..
—— lowlands	547,000	3	6,837	..	..	3	6,837	..
Hampshire	516,600	3	6,457	..	..	3	6,457	..
Isle of Wight	61,000	3½	800	..	..	4	1,016	..
Wilts downs	583,500	2¾	6,684	..	..	2¾	6,685	..
—— pasture	117,500	3	1,460	..	..	4	1,958	..
Dorset	632,240	3½	9,880	..	..	3½	9,878	..
Devon	436,850	4	7,280	..	..	5	2,275	6,826
Ditto	..	8	..	193,750	6,458	8	..	6,458
Cornwall	203,000	4	3,382	..	..	7	..	5,920
Total	14,854,299		193,475	4,153,308	131,794		120,655	263,847

1800—Short fleeces	193,475
Long fleeces	131,794
	325,269
Short and long skin and lambs' wool	58,705
	383,974
Part of Wales not included in the above tables	9,262
Increase from 1800 to 1828	69,933
	463,169
1800—Packs of short wool	193,475
1828—Ditto do.	120,655
Decrease	72,820
1828—Short fleeces	120,655
Long fleeces	263,847
	384,502
Short and long skin and lambs' wool	69,405
	453,907
Wales taken as before	9,262
	463,169
1800—Packs of long wool	131,794
1828—Ditto do.	263,847
Increase	132,053

1800—Total quantity of short wool	193,475		
Ditto of long wool	131,794		
		325,269	
1828—Total quantity of short wool	120,655		
Ditto of long wool	263,847		
		384,502	
Increase of wool		59,233	fleeces.
Increase of skin and lambs' wool		10,700	
Total increase		69,933	

The wool from slaughtered sheep and carrion not mentioned in this table; but allowed for above.

The reader will be pleased to see the foregoing Tables of Luccock and Hubbard, of which mention has been so frequently made, contrasted with each other. Neither of them is perfectly correct, but they both approximate to the truth; and they present a very fair delineation of the change which the fleece underwent in the interval between the dates of the two tables. They are taken from that invaluable work, M'Culloch's Dictionary of Commerce. The country will, however, soon require other tables of a somewhat different construction. The fleece of the Leicester and short-woolled sheep must have a distinct column; or the middle-woolled sheep yielding, to all intents and purposes, a combing-wool, it must rank with the long-wools: in either case, the proper short-wools will present a strangely diminished number of packs, yet the breeders of these sheep may still be proud of them, and will have no reason to complain.

Chapter IX.

THE IRISH SHEEP.

The sheep has been an inhabitant of Ireland from the earliest period of the history of that country; and even in the very region of legendary lore there is no tradition of the source, foreign or domestic, whence it sprung.

The skin of the sheep formed the sole dress of the Gothic tribes by which Ireland was first peopled. The body, bearing many a rude delineation of sacred or terrific objects, was naked, but the shoulders were covered by a lamb or sheep's skin. The old chroniclers give some amusing accounts of the changes which this simple vestment underwent, first extending upward in the form of a hood, and then trespassing upon the paintings on the chest, and at length spreading over the whole of the upper part of the body; but always composed of sheep-skin. In the sixth century it was changed to a kind of rug or mantle, that is, the woollen manufacture began to be established in Ireland. Whether the mantle was felted or woven does not appear; but there are some curious anecdotes of the colour and the length, and the form of it, and the difficulty of restraining both the lay and the clerical wearer within the bounds of decorum*.

The sheep, or a portion of them at least, were black. Giraldus Cambrensis, another monkish historian, describes his brethren as being "lightly clad in woollen garments, barbarously shaped, and for the most part black, because the sheep of the country are black†." It was, probably, as in many other countries that have passed in review, by careful and continued selection alone, that the dingy hue of the native breed was here changed to a whiteness which in many parts may challenge competition with the choicest of the English flocks.

History is silent as to the period when this was effected, as she is with regard to almost all other improvements in Ireland, and seems to have confined herself to a narration of the dissensions, and massacres, and wrongs which succeeded in rapid and unvaried succession.

Scarcely any country could be better adapted than Ireland for the breeding and perfecting of the sheep. The climate was equally remote from chilling cold and intense heat. There were, indeed, several millions of acres that were waste and abandoned; for in few periods of the Irish history had the agriculturist much inducement to improve his land or the flocks which it bore: but the soil was generally prolific, almost beyond belief; the highest mountains were pasturable, except in unusually cold seasons, and the low grounds were covered with perpetual verdure. It was in the grasses principally that Ireland was fertile. She was comparatively deficient in trees and the larger vegetables, but, everywhere, her surface was covered with the most luxuriant and seemingly inexhaustible pasture.

Incidental mention is made of her sheep and her wool. When she fell under the alleged, but incomplete dominion of England, although there were no large manufactures of woollen goods established in any part of the island, the value of her fleece was recognised in the numerous prohibitory laws which were enacted against the exportation of it, and the impossibility of carrying them into effect. Thousands of packs of wool were smuggled away from the western coast of Ireland and conveyed to France

* Colgan. Act. Sanct. Hib. i. 398.
† Ledwich's Antiquities of Ireland, p. 332.

and to Flanders, and immense fortunes were made by this contraband trade.

There were no large manufactories, because, for many an age, from the peculiarity of the civil state of the people there was no capital to found them; there was no fuel to carry on the different processes; there was a melancholy deficiency in almost every branch of useful knowledge that could be made subservient to the purposes of such a manufacture; there was no market, and there would not be any for a considerable period, because the cottagers and the little farmers spun their own wool, and made it into coarse but comfortable garments for themselves and their families, and because, the material being thus extensively used, sufficient could not be obtained for the purpose of a large manufactory except at an enormous price. There was no scarcity of sheep or of wool; but the wool was bespoken, and it could not be withdrawn from its natural and long-established channel without a sacrifice in price that would materially diminish, or altogether destroy, the profit of the manufacturer. One cause more of the want of woollen manufactures in Ireland,—a disgraceful but an all-powerful one—was the jealousy of the sister kingdom. England cultivated the sheep and manufactured its fleece; and she was afraid that the prosperity of Ireland would be inconsistent with, or would diminish, her own.

The universality of the home or coarse manufacture in Ireland will sufficiently account for a circumstance which has appeared strange to many persons, that while the flesh of the sheep was considerably dearer in England than in Ireland, wool was nearly 50 per cent. dearer in Ireland than in England. The greater part of the wool was never brought to the market; it was shorn and spun, and woven, and nothing was thought of the value or the price of it. It was the surplus only, and that a small quantity, and, from that circumstance, very dear, that could be procured by those who did not rear the sheep. Arthur Young inquired into the price of wool in every one of the Irish counties, and he found that the average was 13*s.* 8*d.* the stone of 16 lbs., while wool of the same or a better quality would not obtain more than 9*s.* 3*d.* in the English market*.

There was another species of home, or private manufacture. The well-disposed cottager (and he was a far different person in former times than since the population has so rapidly increased, and his employment and provision so materially changed) would spin a great deal more of the wool than he used, and the combers would establish themselves in every village, and buy up the wool that was not used, and comb it, and at very little expense would have it converted into yarn by the women and children of the place. In 1772, 2045 stones of wool were exported from Ireland to England, and no less than 115,754 stones of worsted yarn, the principal part of which was sent to Norwich and disposed of in the manufactories of that town. The population of Ireland increased, and the character of the agricultural class, and of the little tenants especially, materially changed. The *conacre*† system came into fashion, and the cottager had no longer

* Young's Tour in Ireland in 1780, part ii. See also Transactions of the Irish Academy, vol. ix. p. 240.

† On the *conacre* system a small tract of land is let for the cultivation of potatoes in the first instance. It is usually peaty or lately recovered bog-land, and exceedingly fertile. It is of that quality which does not require manuring. In some cases it is so rich that the potatoes grew, as it were, upon the grass; no regular digging taking place, and only a little of the earth being thrown over them in order to cover them. This land is let in very small quantities, from the eighth of an acre upwards, and from £7 to £10 per acre.

The second year a little care is bestowed upon it—it is dug, but it is not manured; and

his two or three sheep to manure his little farm, and to supply him with milk and wool: but the sheep were principally cultivated by the larger farmers alone, and the cottager and his family abandoned themselves to idleness, or to something worse, and the wool was no longer spun at home. How stood the exports then? Take them in 1811: 2407 stones of wool were exported, and 3412 stones of worsted yarn. The quantity of yarn had diminished more than 112,000 stones, and the surplus wool was devoted to the Irish manufactories, by which it could now be procured much cheaper, and which were established in Dublin and Cork, and Waterford, and Bandon, and Lismore, and in many other places, and which have almost uniformly and rapidly increased and flourished.

Sir William Petty, writing in 1691, thus computes the number of sheep in Ireland. The wool which was annually exported amounted to above two millions of pounds. In order to furnish this, allowing for the lambs not shorn, and for sheep slaughtered, there must be nearly a million of sheep. The quantity of wool consumed in the home manufacture amounted to a great deal more than six millions of pounds—which would require two millions of sheep, making in all four millions. At this period, according to Geoffrey King, there were only twelve millions of sheep in the whole of Great Britain*.

There are two breeds of sheep in Ireland, the short-woolled and the long-woolled. The short-woolled are most prevalent in the county of Wicklow, and have established themselves upon its mountains from time immemorial. This sheep has a small head, narrow face, and short, round, and pricked ears; the head and face smooth, and covered with short hair, the wool extending only to the joining of the head and neck; the neck long, the general proportions good, but rather too slender; the legs small and clean, and not very long; the hair of the tail remarkably coarse, even more so than in long-woolled sheep; the fleece coarse or wavy, and occasionally matted, yielding from 2 to 3 lbs. a fleece, and the fibre about two inches in length. This wool is appropriated to the manufacture of flannel, of which a great quantity is made, and chiefly sold at Rathdrum.

A few of these sheep still remain pure on the mountains, and are carefully preserved from admixture with the "Bull" breed—so the English sheep that have been introduced here are called. The pure breed is termed the Cottagh sheep. It used to be found in considerable quantities in Galway, and particularly on the Connamara mountains. Its numbers, however, are now much diminished from crosses with different breeds, but most of all, because, although there is room for the cultivation of the short-wool to a far greater extent than it has yet been carried, the general soil and pasture of Ireland are better suited to the long-woolled species, which are rapidly establishing themselves in every part of the island. No care has been taken to secure this native and valuable breed. The breeding ewes are suffered to wander on the mountains, often quite neglected, and the loss of lambs from eagles, foxes, and the inclemency of the weather, is

thus it goes on for three or four, or five or six years, according to its quality; there being after this a succession of white crops. The land which brought £10 for potatoes, will let for about £7 or £8 for oats, at the commencement of that system of cropping. Two years afterwards it will not yield more than £6, and then £4, and so on until it becomes almost worthless. There is an end to all sheep husbandry upon this system; and there is a gradual deterioration of the land, the ultimate and not distant consequence of which must be deplorable. The rapidly increasing population of the country has led to it, and without it there would be no provision for the poorer classes.—Evidence before the House of Lords in 1833.

* Political Anatomy of Ireland, p. 56.

enormous; while, strange to record, the sides of the mountains and the lowlands immediately beneath them afford facilities for better management, and particularly for the introduction of the turnip husbandry, which ought not to have been neglected*.

The mountain sheep has been crossed with the South Down, and with evident advantage—yet from the prejudice and jealousy of the Irish farmers, this admixture has not been established to the extent which it deserves. The Merino and the mountain sheep have also been brought together, but the cross has been regarded as a failure. The Merinos are not suited for the wet and cold pastures of the Wicklow hills.

The pure South Downs have been introduced, and under the most flattering auspices. The Farming Society of Ireland sent several South Down rams into Wicklow for the gratuitous use of the breeders there. They were first crossed with the mountain ewe, and great improvement of the fleece seemed to be the immediate result. Some of the wool, that used to sell at 14*d.* or 16*d.* per lb., advanced to 3*s.* 6*d.*; and the Earl of Meath obtained 4*s.* 2*d.* for a considerable portion of his fleeces.

Many South Down ewes were then imported, and the breed of the South Downs zealously cultivated. At the annual sale of clothing wool at Dublin, in 1809, some of Mr. Symes's South Down wool was sold at 7*s.* per lb.; some belonging to Lord Claremont at 5*s.* 7*d.*, to the Marquess of Sligo at 5*s.* 3*d.*, and some of the fleeces of Mr. Wynne's flock at 3*s.* 6*d.*

At the sale in the following year, Lord Claremont's wool sold at 5*s.* 6*d.*, Mr. Grierson's at 5*s.* 7*d.*, Mr. Critchley's at 6*s.* 6*d.*, Mr. Wynne's at 6*s.* 7*d.*, Mr. Dudley's at 7*s.*, Mr. Beresford's at 7*s.* 11*d.*, and Mr. Symes's at 8*s.* 5*d.* Some South Down lamb's wool belonging to Mr. Symes was sold at 5*s.* 2*d.*

These prices may appear extraordinary to those connected with the wool trade; but the sum was much enhanced by the premiums offered by the Society for the best piece of cloth manufactured of South Down wool. This occasioned a great competition among the buyers. At an after period, when these premiums were no longer offered, and there was an adequate supply of this wool in the market, it speedily sunk to the common price of English wool†.

No speculation could have bidden fairer than this, to realize the most sanguine expectations of those concerned in it; but it did not succeed. It probably had not fair play. Patronised as it was at its starting, it had a fearful amount of prejudice to struggle with; and the result was, that neither the South Down sheep nor the South Down cross was permanently established in Wicklow. Many flocks of South Downs are found in various parts of Wicklow; and in most of the Irish counties there is plenty of ground that seems to be beautifully adapted to their constitutional habits; but they are not the breed of the country.

The long-woolled sheep—the established *Irish sheep*—had not for a long time justice done to them. Mr. Culley attended the fair at Ballinasloe at nearly the close of the last century, and the following is the account which he gives of the Irish sheep:—"I am sorry to say I never saw such ugly sheep as these—the worst breeds we have in Great Britain are by much superior. One would almost imagine that the sheep-breeders in Ireland have taken as much pains to breed awkward sheep, as many of the people in England have to breed handsome ones. I know nothing to

* Quarterly Journal of April, 1835, p. 172.
† Wakefield's Account of Ireland, p. 713.

recommend them except their size, which might please some old-fashioned breeders who can get no kind of stock large enough. But I will endeavour to describe them, and leave my readers to judge for themselves. These sheep are supported by very long, thick, crooked, grey legs; their heads long and ugly, with large flagging ears, grey faces and eyes sunk; necks long and set on behind the shoulders; breast narrow and short, hollow both before and behind the shoulders; flat-sided, with high narrow herring backs; hind quarters drooping and tail set low. In short, they are almost in every respect contrary to what a well-formed sheep should be*."

A great deal of this must be set to the score of prejudice. The thickness of the leg did not consist so much in the bone; it was covered with wool to the very feet. The ugliness of the head also depended far more on the wool by which it was covered, than on the actual largeness or deformity of the skull. Compared with the beautiful sheep that Mr. Culley was breeding at that time, there was a length of neck, and narrowness of breast, and high herring-back, displeasing to his eye, but which, in the estimation of any other person, would not have presented such a mass of ugliness; and that they had many good points about them was very soon apparent from the rapidity with which they improved when crossed with the Dishley breed.

Many of their owners were as sensible as Mr. Culley could have wished them to be, of the imperfections of the native breed; and a very short time elapsed before they effected an almost incredible improvement in them. The first serious attempt at improvement commenced in Kilkenny. Mr. St. George and Mr. Astley of Odston imported some sheep selected from the flocks of Mr. Paget of Ibstock, Mr. Stubbings of Holm, Mr. Buckley of Normanton, and some others of the chief breeders of the New Leicesters. They bred from this valuable selection, and were soon acknowledged to be in possession of a flock of sheep not inferior to that of the most successful English breeders.

They soon commenced the useful and profitable business which had been established by Mr. Bakewell, and let their tups to farmers in different parts of the country at very considerable prices. In 1800 they let thirty rams for £1744. The price of one of them was to have been 150 guineas and 5 ewes sent; but such was the prejudice which existed against the breed, and the malignity that was excited in the minds of some dastardly opposers of the improved system, that the poor animal was murdered the night after it had arrived at the farm of Mr. Cossan, near Tipperary, by whom it had been hired. In 1801 the letting was to a greater extent. The names of the hirers are here recorded as those who, by their zeal to improve the Irish breed of sheep, deserved well of their country.

Mr. Wynne of Halewood, in Sligo, and the Rev. Thos. Radcliffe of Castlecoote, Roscommon, hired rams at 150 guineas each. Mr. Millet of Scotsborough, Kilkenny, and Sir R. B. St. George, Bart. of Woodgift, hired some at 100 guineas each. Mr. Lewis of King's County, Mr. Murphy of Tipperary, and Mr. Lalor of Ballyragget, at 60 guineas. Mr. Langley of Brittas, Tipperary; Mr. Lloyd; Lord Doneraile of Doneraile, Cork; Lord Donoughmore of Knocklofty, Tipperary; and Mr. Brown of Mount Prospect, Roscommon, at 50 guineas. Mr. Kirwan of Mayo, at 40 guineas. Mr. Reinael of Reinella, West Meath, at 30 guineas; and Mr. M'Cullough of Ballyragget, Kilkenny; Mr. Mitchell of Goresgrove, Kilkenny; Mr. Lalor of Kildare; Mr. Boyce of Bishopshull, Kilkenny;

* Culley on Live Stock, p. 166.

Mr. Neville of Mary Mount, Kilkenny; Mr. Levinge of Bellevieu, Kilkenny; Mr. Wade of Fort William, Roscommon; Mr. Mitchell of Roscommon; the Rev. Dr. Butler of Kilkenny; Sir Edward Crofton, Bart. of Moate, Roscommon; Colonel Bagwell of Marlefield, Tipperary; Mr. Kirwan of Mayo, and Mr. Tighe of Woodstock, Kilkenny, at 20 guineas each.

Mr. Kirkpatrick of Urlingford likewise distinguished himself in the letting of Leicester tups. He had a show for them on the 4th of June. He exposed them first in their wool, and then shorn. They were kept entirely on green food, it being considered a point of honour not to allow them any corn.

It would be superfluous to repeat the story of the Dishley sheep. The new breed struggled for a while against prejudices and difficulties of every description, and at length completely triumphed. The bad and unsightly points of Mr. Culley disappeared one by one. The sheep became smaller but more compact, and nearly or quite as heavy—more of them could be kept on the same quantity of ground, and they came to maturity twelve or eighteen months sooner than they had previously done. They gradually spread over the whole of Ireland. A few of the short-wools were left, maintaining with them an unequal conflict; but every long-woolled breed was changed, ameliorated, or totally removed from the land; and the Irish sheep that are now brought so plentifully to the English market will scarcely yield to the best improved Leicesters that any part of Great Britain can produce.

The wool appeared at first to be shortened, and the breeder was somewhat alarmed; but it eventually proved to be thicker set on the pelt, and was in fact heavier and better. It assumed very much of the character of the Romney Marsh wool, so valued in the foreign market. Its price at the present moment (Sept. 1836) is from a shilling to fourteen pence in the pound, and the fleece weighs from 6½ to 7 lbs.; the hogget fleece weighs from 5 to 5½ lbs.

The following is the microscopic appearance of a fibre of fair Irish long wool—



1. Viewed as a transparent object, it is the 560th part of an inch in diameter. The Leicester wool was the 500th part. The serrations are 1920 in the space of an inch; the Leicester wool had 1860 serrations; but they are not of so decided a character as those in the Leicester; many of them are indistinct, and few only can be said to be at all hooked. It is evidently adapted for a somewhat different fabric than the Leicester; it approaches nearer to the Romney Marsh wool, but it does not manufacture so well.

2. It is viewed as an opaque object; the leaves that form the cups are rather indistinct: six or seven of them constitute the cup; they are pointed, but evidently weak.

The Irish wool is very useful for the manufacture of stuffs, bombasins, and bombazetts; a great deal of it is now sent to the English market, and in return the Irish manufacturers purchase a considerable quantity of South Down wool to work into some of their finer goods.

The improvement in the fattening quality and early maturity of the Irish sheep has opened a new trade. The breeder, being now able to send that animal to market at a little more than two years old, which he was

formerly compelled to detain until it was nearly or quite four, and having even his hoggets ready for the butcher, finds that he can compete with the English breeder on his own soil. He therefore now sends over a vast number of live sheep to Liverpool principally, and a few to Bristol. The steam-boats enable him more readily and with less expense to accomplish his purpose. The export of live sheep from Ireland commenced in 1797; at least so few had been previously sent, that no account was taken of them in the books of the Custom-house. In that year there is an entry of 1875, which found their way across the Irish Channel. In 1811 that number had increased to 26,029; and in 1831, 134,762 were sent from Ireland to Liverpool. Sheep were then dear in England on account of the great number that had died of the rot in the two preceding winters, but in the following year 74,260 were exported*.

The rapidity with which the steam-boats perform their voyage has suggested a new method of supplying the English market. The sheep is killed in Ireland; it is then neatly packed up, and arrives at Liverpool early on the following morning ready for sale. The numbers thus imported are rapidly increasing. In addition to all these sources of supply, more than 20,000 lambs, in good market condition, are every year sent across the Irish Channel.

This is an immense drain upon Ireland, and many persons have doubted whether it is not an unnatural state of things, that must soon terminate in the exhaustion of the country. One thing, however, is certain, that the improvements which first induced this traffic can increase the supply to an almost indefinite extent. From the earlier maturity of the sheep, and the improvement in agriculture generally, a greater number of sheep can be reared and fattened on the same space of ground; and there are millions of acres in Ireland, now almost useless, that may be converted into sheep-pasture. In addition to this it should be remarked, that a comparatively small quantity of mutton is used for human food in Ireland. The poor,—the great mass of the population,—rarely or never touch it. They live chiefly or entirely on milk and potatoes; and if, on some extraordinary festival, their fare is amended, it is their own porker that provides them with the unusual luxury. Where human ingenuity can accomplish it, and here it well may, the supply will keep pace with the demand.

The more general introduction of turnip husbandry, and for which the greater part of Ireland is suitable, would open another almost inexhaustible source of sheep-provender and supply. The mildness of the climate enables the Irish stock-master to do with little winter food; but this natural advantage proves an artificial evil, for it prevents those exertions which the farmers in other countries are obliged to make in order to support their flocks and herds. Turnip husbandry was established in Tipperary as early as, and more extensively than, in any other part of Ireland; and the consequence was that the sheep farmers there had a plentiful supply for the metropolitan market in the earliest part of the spring.

Some peculiarities in the management of sheep in the different districts

* The charge of the freight of sheep from Dublin to Liverpool is now from 35*s.* to 42*s.*, and of lambs 20*s.* to 30*s.* per score. The agents of the steam companies take charge of them at Dublin or elsewhere, and transmit them to Liverpool without trouble to the owner. There are several large dealers always attending the Dublin market. If prices fall in consequence of a large supply, they are always ready to take the advantage of this, and make extensive purchases late in the day, and when the farmer is probably induced to take almost any price that they will offer, while the dealers understand each other too well for there to be much competition among them.

of Ireland will be best noticed by taking a rapid survey of the respective counties. It will be convenient to commence at the southern extremity of the province of Leinster, and, pursuing a northern direction, make a circuit of the island.

There is nothing out of the usual routine in WEXFORD. The original breed was, if possible, worse than that in the neighbouring counties, but it has nearly disappeared; the taint however has not quite passed away. The Wexford sheep are not those from among which the grazier would select his favourite stock; in fact they are not the principal object of the farmer's care.

KILKENNY will always be a district of peculiar interest to the sheep-breeder. The great work of the amelioration and perfection of the Irish long-woolled sheep was begun and zealously pursued here, and yet perhaps districts might be pointed out, farther to the south and the west, where a better sheep than even the Kilkenny one is now to be found. Wonderful changes have taken place in the management of the sheep since the introduction of the improved breed. The lamb is now rarely shorn in the first year, but left to become a hogget. The milking of the ewes for two or three months after the lambs are weaned is a practice nearly discontinued, and the celebrated ewe-milk cheeses are not in so much request in Kilkenny market.

In Kilkenny some of the most satisfactory experiments were made on the Merino sheep at the manufactory of Messrs. Newlan, as related in page 183 of this work. Crosses of the Merino with other breeds were also made here. That with the Ryeland sheep was deemed the most valuable. The Merino and the Leicester made a good wool in its second or third cross, and which was useful for general purposes. With the South Down the staple was fine, but there was much of the harshness and want of felting property of the Down sheep. With the mountain breed from the Wicklow hills the cross was considered as valuable*. Sixteen years have since passed, and all these crosses are comparatively abandoned, or got into disrepute: the pure Merino wool is alone used for felting purposes, and the British wools are all taking their stations among the middle or long-woolled varieties.

A considerable quantity of blankets is manufactured in Kilkenny: they are in good estimation, and might be rendered sufficient for the home consumption.

CARLOW has lately suffered much by the disunion which political and religious dissensions have produced between the landlord and the tenant; but it still continues to furnish the most pleasant tasted of the Irish butters, and the sheep of this district are of a superior description. Many of them are fattened for the supply of the Dublin markets and for foreign exportation.

WICKLOW has been already mentioned as the native county of the Irish short-woolled sheep. The mountains of Wicklow are admirably adapted for such a breed, and, in a severe winter, will put their hardihood to the test. Few of the genuine breed of Wicklow sheep now remain; but they have been crossed in almost every possible way, in order better to adapt their wool to the altered demand for it†.

* Agricultural Magazine, August, 1820.

† Mr. Hamilton of Glencullen, about thirty years ago, purchased several of these sheep from a family of mountaineers who had preserved the breed pure from time immemorial. He meant to breed from them alone, and to try how far he could improve them on the principle of selection; but he failed, from a cause that was then

Wicklow being a contiguous county to Dublin, the practice of preparing lambs for the January markets occupies much of the attention of the sheep-farmers. Some of the contrivances are singular enough. The flock of the farmer consists usually of a hundred ewes, which are kept as well as his pasture will allow. In the beginning of June he turns the rams among them, and before the end of July the greater part of the ewes are impregnated. This early disposition in the ewes for the ram is the joint effect of habit and of breeding. If at the end of July any of them should not have been impregnated, they are put into a small barn or enclosed yard, and driven about until they are heated and fatigued; the rams are then admitted, and the ewes offer no resistance.

The lambs, at a fortnight old, are separated from their dams, and placed in small pens in the lamb-house. The ewes are driven into this building twice every day; the mothers of the lambs that have been sold off are first admitted, and held for the remaining lambs to suck them, after which the lambs are suffered to go to their own dams. When the lamb is very young the milk of the ewe will afford it sufficient nutriment; but as it increases in strength assistance from the cow becomes necessary; and, beginning with a quarter of a pint, the lamb will gradually come to the use of a pint of cow's milk twice in the day, exclusive of the milk from the ewe. The four-and-twenty-hours are divided as equally as convenience will permit, and the lambs are fed with the cow's and ewe's milk alternately. Much attention is paid to this, and also to another important object—cleanliness: the boarded floors are so contrived that all moisture shall drain away, and the lambs are always dry and warm upon wheaten straw.

At about six weeks old, or sooner, they are fit for the butcher, and produce, according to the time of sale, from 20*s*. to 52*s*. The whole secret of this vaunted practice consists in regularity and cleanliness; but it is strange that no provision is made, and particularly at the early part of the season, to supply the ewes with turnips or artificial food, so that there may be less call upon the dairy*.

A large wool fair is held in a spacious hall at Rathdrum. It is singular to see the people thronging in on horseback from the country, with their bales of wool, or cloth, or flannel, on either side of them. "On one horse," says Miss Plumptree, "were, beside two very large bales of cloth, two very well-dressed women, who, just before they got to the fair, alighted,

too prevalent, and which made the mountains of Dublin and Wicklow almost a desert. There were whole villages of families, that had been from generation to generation notorious marauders and sheep-stealers, inhabiting the beautiful glens which separated those lofty hills. Their residence and their occupation were well known, yet they were permitted to remain there without disturbance. There were stories then afloat about this, and some names were mentioned as implicated in these disgraceful transactions that should have been above suspicion. However, Mr. Hamilton's sheep were nearly all destroyed, and he was compelled to sell the miserable remnant. The failure of such an experiment was a national loss.—Transactions of the Dublin Society, vol. v. p. 64.

Parkinson, about the same time, relates an instance of this propensity to pilfer among some of the lower classes of the Irish. "There was one species of theft that was new to me, namely, the pulling the wool off the sheep's back when alive in the field. They will also take regularly from the land both cow-dung and sheep's-dung, the former to burn, the latter for the scouring of their thread. On account of these depredations of various kinds, it was the custom with the breeders of sheep to agree with the shepherd to find a lamb for every ewe. This prevented the lambs from being stolen from the ewes, which was a very common mode of thieving. There were about twenty lambs stolen from one flock last season, notwithstanding all my contrivances to prevent it, and although I had cured my people of stealing anything else.—Parkinson's Practice of English Agriculture on an Irish Farm, pp. 146 and 182.

* Radcliffe's Agriculture of Wicklow.

and, sitting down on the roadside, drew on their stockings; they then remounted their nag, and rode on into the fair*."

Much worsted yarn is brought here for sale. The manufactured goods consist of flannels, and other coarse fabrics, wholly composed of native wool. This trade is in a flourishing state; and Rathdrum is the regular and well-established mart for the whole of this district†.

KILDARE.—Many ewe flocks are kept in this county, for the purpose of supplying the Dublin market. They are bought at the autumn fair at Ballinasloe. The lamb is sold in June or July, and the mother in November. There is no breed peculiar to this district. There is a manufactory of coarse cloths at Kildare.

QUEEN'S COUNTY.—Several of the sheep-farmers of this county zealously assisted in the improvement of the Irish sheep. Messrs. Mayer, Steele, and O'Flaherty deserve honourable mention. Many sheep are grazed here, as in Kildare, for the Dublin market. In the mountain districts many cattle and sheep are brought into store condition. The privilege of grazing is let at so much per *collop*. A collop consists of three yearling cattle, or one yearling bullock and one two years old, or four sheep.

KING'S COUNTY.—The same system of management prevails here, and also in WESTMEATH and LONGFORD; in the former of which there is an excellent breed of long-woolled sheep.

MEATH.—This is also a decided grazing county, and without any specific breed. Few of the sheep, in proportion to the numbers fattened here, are natives of Meath. The flocks of the graziers are sometimes very numerous. In the month of October they all start for Ballinasloe fair, and each of them buys that which will suit best his system and means of feeding. He that has rape or turnips, &c. purchases those that are the nearest to being fat, and he sells them at Dublin, in the spring, at a considerable profit. They who have not any artificial food, but who feed their winter stock of sheep where their summer stock of cattle had been before, buy those that are in store condition: they turn them on their grounds, and feed them with hay during the winter; and, as soon after shearing time as may be, these are likewise sold in Dublin. Some possibly are not ready until the end of the summer, but all are got rid of before the ensuing Ballinasloe fair ‡.

* Narrative of a Residence in Ireland, in 1814 and 1815, by Anna Plumptree, p. 182.

† Transactions of the Irish Academy, vol. ix. p. 238.

‡ Mr. Parkinson, the author of a valuable work on "The Breed and Management of Live Stock," once occupied a farm at Slane in this county. It was an unsuccessful experiment; but the reader will derive some amusement and a great deal of instruction from the perusal of the narrative which he published of his proceedings. (See Parkinson's Practice of English Agriculture in Ireland.) The principal causes of his failure were the untractableness of those with whom he had to do, and the want of a convenient market for the produce of his farm. His account of the manner of sheep-washing and shearing may afford some amusement. "At the proper season they told me they had the best method, and the most convenient place possible; but when I came to see the place, and understood their mode of proceeding, I deemed them both to be the worst possible. The sheep were taken to the side of the river Boyne, where four or five men were stationed to throw them into the water, and ten men to wash them, and there was a double set of these. One man took hold of the fore legs of the sheep, and another of the hind legs, as soon as they could seize him in the water, and thus they tossed him to and fro several times in the water. The next two men then seized him and served him in the same way, and so with the other six. There was evidently considerable danger of accident, besides a great deal of confusion. They drank four gallons of whisky among them, and they only washed half of my sheep. In the evening I began to calculate my expense. The thirty people employed cost me 25*s.*, the four gallons of whisky they drank cost 24*s.* more; and altogether it amounted to more than 2*s.* 6*d.* per score; whereas I used to have my sheep washed in England at 4*d.* per score. I resolved, on

Dublin.—No flocks of sheep are permanently bred in this county, but some are grazed for the home market; others tarry awhile in the neighbourhood of the coast before they are embarked.

Nearly the same character must be given of Louth and Monaghan: the land is employed in tillage, and cattle and sheep are neglected. In Monaghan the goats are more numerous than the sheep.

Mr. Wakefield gives a singular account of the sheep management of Downshire in his time, and traces of it still remain. The butcher, in almost every town, buys his sheep singly or in pairs from the little farmers, and the farmers purchase them in the same way, when lambs, at some of the summer fairs, and keep them as long as they find it profitable or convenient. There are a vast number of little farmers in this county; and the traveller can proceed a very little way without perceiving a sheep tethered in the corner of a field or the side of a ditch. Their way of tethering was rather curious: two stakes were driven into the ground, with a rope extending from one to the other, and this rope passed through a ring attached to a short chain round the animal's neck.

Lord de Montalt was one of the first in this part of the country to substitute the Leicester breed for the old long-legged Tipperary sheep; and he likewise practised folding with great success. It is a simple and profitable way of disposing of the sheep at night; but there were few things the aversion to which the intelligent farmer found more difficult to conquer in his dependents.

Armagh.—The traveller is here entering on the manufacturing districts of Ireland. The soil is poorer, but the cultivation of it is better. There are more small farms and fewer of the peasantry. Much improvement has been effected in the arable management of the land, but the stock of the farmer, and particularly in the western division of the county, is not good; the cows are little better than mountain cattle, and there is a great want of sheep. Very little of the wool that is produced is exposed for sale, but reserved for domestic purposes. It is very coarse; and the native sheep of the district is a sadly unimproved animal. The manufactures of Armagh are almost exclusively those of linen.

The same observations apply to Antrim. The sheep are of a very inferior kind; but the people being more exclusively employed in the manufacture of linen and cotton, the wool is bought up by combers, who employ

the following day, to endeavour to save part of this expense, and I had a kind of fold made in the river, by which means I could proceed as expeditiously with half the number of men. The men were tractable to a certain extent, but, contrary to common rule and common sense, they would wash the sheep down the stream instead of against it, so that the dirty water ran from the first man to the last. With a great deal of trouble I got the reduced number of men to wash the remainder of the sheep at an expense of about 1*s.* 6*d.* per score.

"In due time came the shearing. I was promised the best set of clippers in Ireland. They were to have 2*s.* 6*d.* per day each, and their victuals, which could not be calculated at less than 2*s.* 6*d.* more. This may seem a very extravagant calculation, but the men were unaccustomed to such living, and they ate so immoderately that without one saw it one would hardly have believed it. I never supposed but these men would clip twenty sheep a day at least, but the day's work proved to be but thirteen each; so that the whole expense of washing and clipping was 10*s.* 8*d.* per score. I could have had it done in England much better for 3*s.* 4*d.* a score.

"Beside all this, these Irish clippers do not clip round the sheep as the clippers do in England; but they clip short strokes, catching a bit of wool from one place, and a bit from another. If they are not narrowly looked after, they will leave many parts untouched, such as the head and legs, and the inside of the thighs and tail. But every kind of rustic work in Ireland is done in a similar manner."—Parkinson's Practice of Agriculture, p. 187.

women and children to spin it into yarn; it is then sent to some foreign market.

Londonderry is not a grazing county, and the flesh of the sheep is little used for food, except in the towns. Some of the small landholders have a few sheep, but they are tethered together in couples; a flock of sheep is rarely seen, and when found, both the carcase and the wool are of an inferior character. The wool is generally disposed of in the same way as in Antrim. There are still a few mountain-sheep in Londonderry, but they are rapidly disappearing*.

Donegal.—The sheep-husbandry of this county is not very different from that of Londonderry. There are very few sheep in the lowlands, and the mountain-sheep used to partake of the same character as those described by Mr. Sampson. When the corn was carried home the sheep of all the small tenants, "as fleet as so many greyhounds, were suffered to herd together, and rove about without distinction wherever they could find food; and in regard to breed, it was impossible to imagine a worse†."

In Tyrone, Fermanagh, and Cavan, the sheep are few in number, and of an inferior breed.

Leitrim is in the province of Connaught, which is, with Munster, the principal sheep district, where the sheep are most improved, and whence comes the chief supply of the home consumption and of the increasing exportation. The rich grazing soil of Connaught, however, lies to the south of Leitrim, and the sheep here are neither numerous nor much improved.

In Sligo the work of improvement has not only commenced but considerably advanced. There are many flocks of the modern Irish breed which do credit to their proprietors; but, in general, the farms are small, and the sheep oftentimes neglected.

In Mayo, neither on its heathy mountains nor its fertile valleys, is the breeding of sheep pursued on an extensive scale. The farmer, however, is now awakening to a sense of his true interest in this respect, and in the district of Kilmain, in particular, the sheep are becoming more numerous and valuable.

Roscommon is both a breeding and a grazing county, and some of the best sheep in Ireland are reared and fattened there. They are of the true long-woolled kind—the old Irish improved, or superseded by the Dishley blood. Roscommon, Galway, Clare, Limerick, and Tipperary, may be

* The account which Mr. Sampson gives of these sheep is too singular to be omitted. "Our best sort are bought either in the fairs of the south-western counties or else at Dervock, to which they are driven by jobbers from these pasture districts. Our own sheep are of all shapes and qualities—horned and without horns, coarse-woolled and fine—and almost all of them humpy-boned and restless. We get a considerable number from the mountains of Inishoen, from 7 lbs. to 10 lbs. per quarter. I have crossed a selection of our own ewes with a strong Connaught ram, and with much advantage.

"In Ballymullans, near Learmount, sheep were formerly kept in great numbers; at present much fewer are permitted, on account of their inroads into the plantations. Not long ago one might see hundreds of sheep travelling from farm to farm, unnoticed and unowned. Every servant boy in the country who had a few shillings laid them out in a sheep or two, which he let loose on the bounty of Providence and the toleration of his neighbourhood.

"Towards May all these flocks were driven to the mountains. The value of their wool and their progeny greatly overpaid the grazing and the risk. In the time of snow these depredators, like the locusts of Egypt, devoured every thing before them. I have lost at one time two thousand heads of curled kale. They get no winter fodder but what they can steal. The lambs come in from June to August, and are sold in general at half a guinea each. The ewes are killed from three to four years old, and weigh from 8 lbs. to 11 lbs. per quarter."—Sampson's Survey of Derry, p. 215.

† Wakefield's Tour, vol. i. p. 345.

considered as containing almost all of sheep-husbandry that is valuable in Ireland. A great deal of land in them, and that of the best kind, is devoted to breeding or to grazing. There is, however, nothing peculiar in the management of the Roscommon sheep by which the traveller needs to be detained.

Galway rears as great a number of sheep and in as high a state of perfection as any of the professed sheep districts. It must not, perhaps, be literally said of them, as one reporter hesitates not to affirm, that "some of the finest flocks in the world are to be found in Galway*," or, as another asserts, "that they," the old sheep, "have nearly all disappeared, and given place to a fine breed not to be equalled by the *general* stock of the long-woolled breed in England†;" but nothing would so readily dispel the prejudice against Irish productions as a tour through those portions of Galway which are devoted to the breeding and grazing of sheep. Fault would be found with the management both of bullocks and sheep, and the seeming abandonment of these beautiful and valuable animals to hunger and cold‡, but the traveller will not be insensible to their excellent qualities.

Ballinasloe fair—the Falkirk tryst of Ireland—is held at the latter end of October. It is the mart of all these sheep-breeding and grazing districts. From 60,000 to 80,000 sheep are generally exhibited, and sometimes very nearly 100,000, and more than four-fifths of them are usually sold. Between 30,000 and 40,000 cattle are frequently driven to Ballinasloe for sale.

Ballinasloe is the place for the traveller to resort to in order to convince himself of the true character of the Irish long-woolled sheep. So improved have they become by the first intermixture of the Dishley blood, by the continued importation of Leicester rams, and by the judicious selection of tups of Irish growth, that no one would recognise a single trace of the uncouth, worthless animal which Cully depicted.

It is pleasing to see the orderly manner in which, during the time of business, the whole is conducted. The ewes and wethers are shown in separate parcels—the ewes in lots of from 100 to 300 or 400, and the wethers in lots of from 200 to 500 or 600; the ewes having a red mark across the loins, and the wedders being without any mark. The different lots stand within a few yards of each other, leaving just room enough to admit of the purchasers walking round in order to inspect the flock.

Each lot is surrounded by a number of shepherds in the employ of the owners of the sheep. They are all dressed in coarse dark-brown woollen cloth. These are Connaught men: and the greater proportion of the sheep belong to Connaught. Every one has his crook, in the use of which he is exceedingly expert. There is another lot of men dressed in the same kind of cloth, but of a grey or frieze colour; these are Leinster men—the shepherds of the intended buyers. There has from time immemorial been a feud between the Leinster and Connaught men, and this leads to many a rude jest, or sarcastic remark; but there is no breach of the peace until the fair is over. No shepherd's dog is permitted in the whole fair. 80,000 sheep were shown

* Wakefield's Tour in Ireland, vol. i. p. 346.

† Dutton's Survey of Galway, p. 115.

‡ "Cattle and sheep are seldom housed even in the severest weather, but range about the land, poking it full of holes. On the 1st of June, 1810, upwards of six thousand sheep were destroyed, in this county alone, by a severe storm of hail, and snow, and rain. The mornings of the end of May were frosty, and many breeders lost more than sixty, mostly ewes, which had been shorn only two days before."—Dutton's Survey of Galway. Dutton wrote in 1824, and even at that time the same negligence and inhumanity prevailed.

at the fair of 1834, of which more than 70,000 were sold; and their value, at 34*s.* per head, was nearly 120,000*l.** In 1836, only 61,094 were shown, of which 53,214 were sold. The average price of wethers was from 45*s.* to 55*s.*; that of ewes was from 35*s.* to 45*s.*; and of hoggets, from 30*s.* to 38*s.*

The business of the fair being terminated, another act commences. The love of whisky, and the love of fighting, are, by a kind of prescriptive right, permitted to display themselves in all their glory; and the play terminates with the customary number of broken heads and other contusions.

Ballinasloe summer fair used to be the principal and almost the only wool-mart in Ireland; and strange scenes were there exhibited, in full keeping with Irish propensities and character. The meeting in July seemed to be devoted more to the purposes of conviviality and the endeavour to overreach each other, than the honest sale and purchase of wool. The buyers and the sellers loitered about the streets and inns of Ballinasloe, disputing about a few pence in the price of a stone of wool, day after day, and almost week after week, spending ten times more than the sum which the one would have paid or the other received. Sometimes a party of them would start away for some distant place of amusement or resort, and return not to the fair during many days, hoping then to find their antagonists completely wearied, and ready to agree to any bargain. The bad habits too natural to the Irishman were indulged in without restraint, and the foundation for neglect of business, intemperance, and eventual ruin, was often laid at Ballinasloe fair. The wool is now disposed of in a more orderly way in the principal towns of the respective counties, or it is sent to the wool-mart at Dublin†.

In the mountains of Connamara, and in the hands of a few gentlemen, some of the native short-woolled sheep remain. The shearing, at least among the small proprietors, was singular enough, and the practice is not quite discontinued at the present day. The wool is cut as it is wanted, and one sheep is seen with one side shorn, and another with a single limb clipped. When a woman wants a little wool in order to finish her work, she trips away to the mountain, claps the sheep's head between her knees, and shears just as much as she thinks will complete her task. The same sheep is often shorn three times in the year, and this operation is not confined to the summer months. It is thought, but to a considerable degree erroneously, that the animal suffers little from this singular practice‡.

A great deal of flannel and other woollen goods is prepared in Galway. The cottager, or farmer's wife, spins the wool into yarn, and sends the yarn to the weaver, and often earns sufficient to pay the rent of her little tenement. There is not, however, in the whole of the county any large manufactory. This is not a little extraordinary, considering the extent of

* This account is chiefly extracted from that valuable agricultural periodical, the British Farmer's Magazine, vol. viii. p. 565. The correspondent of that periodical adds a word or two of advice which may not be useless to the traveller. He is supposed to be returned from the fair held in Lord Clancarty's demesne, and to have arrived at Ballinasloe. "You will begin to think of your bed; the price you may have to pay for it may also strike you. This for a good bed is seldom less than half-a-guinea a night, and frequently a guinea; sometimes four guineas for a room for a week. Never sleep in a double-bedded room if the second bed is to be occupied, unless you well know, and are particularly intimate with the person who is to occupy it, and take care to sleep with a blanket under you, and one over you. By not attending to these cautions your purse or your life may be sacrificed."—p. 568.

† Dutton's Survey of Clare, p. 129; and Wakefield's Account of Ireland, vol. i. p. 710.

‡ Dutton's Survey of Galway, p. 430.

Galway; that it possesses wool of both kinds, and each of good quality; and that there are so many spots where a manufactory could be established with evident advantage *.

Clare is in the province of Munster. In this county, Limerick, and Tipperary, the sheep vie with the best of those in Connaught; and the state of agriculture, and the manners and habits of the peasantry, are considerably improved. Clare is both a breeding and grazing county. A great part of the limestone district is devoted to the breeding of the long-woolled sheep that are afterwards sent to Ballinasloe fair. The lower and richer tracts are set apart for grazing. There is nothing peculiar in the management of the sheep in this county †.

Limerick is not a breeding county, but many excellent sheep are fattened here. There is a great deal of fine pasture land in Limerick; a portion of it is called, on account of its fertility, the "Golden Vein."

The *Conacre* system is here fully established. Only a few days ago the author read an account of a certain portion of land being let at no less than 12*l.* per acre, and of no fewer than sixteen white crops being successively produced without the expenditure of a single load of manure. Such a system must eventually be productive of irreparable mischief.

A great many lambs used to be sent from Tipperary to be wintered in Limerick. They were received in October and returned in May. The propriety of this was doubted by some; for the Tipperary land is, generally speaking, drier than that in Limerick. The practice is now much discontinued.

Kerry.—There are not so many sheep in Kerry as its pastures would profitably bear. They are occupied by the grazing of cattle for the Cork markets, or the manufacture of butter. The mountains of Kerry continue to produce a breed of small short-woolled sheep, which, when fattened, yield excellent mutton; many hundreds of them were shown at the Ballinasloe fair in 1836. Most of the islands on the coast of Kerry contain cattle and sheep; but the county generally is devoted to the former, and the latter are comparatively neglected.

Cork.—There are two objections to the sheep being an object of much consideration, or thriving to any great degree, in Cork, namely, the vast number of dairies, and the smallness of the farms. Lord Doneraile first introduced the Dishley sheep into Cork, and the improvement of few flocks was so rapid and complete. The breed has been since neglected in various parts of Cork on account of the prevalence of the dairy system.

A few of the native breed are yet found in the mountains, and in the wild parts of the west; but those that are seen in the lower ground are long-woolled. Mr. Townsend gives an account of the management of the sheep in this dairy county. "Farmers of every description keep a few ewes, as well for themselves as for their labourers, and from which a small supply of milk is obtained at the cost of the poor lambs, to whom is left a very small portion of their natural aliment. In fact, the poor sheep is sadly put upon here. In its youth it is stinted to half the proper quantity of food; when grown up it is compelled, by the bondage of fetters, to remain on the barest fields of the farm; and during the winter the sheep alone is denied the occasional protection of a shed, being exposed to every blast, without the comfort of a good bellyful of food. A few of the lambs are fattened for

* Dutton's Survey, p. 424.

† Wakefield's Account of Ireland, vol. i. p. 342.

the market, and the rest, excepting what the farmer requires in order to keep up his stock, are sold off at the summer fairs*."

A considerable quantity of a coarse kind of carpet is manufactured in Cork. A cloth manufactory likewise flourished here, in which much of the Irish short wool, mixed with some of foreign growth, was used in the fabrication of broad-cloth. The material here, as well as in every other place, has changed with the change of times and of wool. A great deal of wool used to be brought from Galway and Roscommon, combed by the combers, and spun into worsted yarn, and exported to Yarmouth and Norwich.

Waterford is likewise so occupied by the dairy system, that the sheep are comparatively neglected, and cannot boast of any peculiar excellence of breed or management.

Tipperary.—The farmers in this county, at the first introduction of the Dishley breed, took a leading part in the improvement of the sheep. Mr. Dexter was one of the most zealous and skilful among them. It is said that his first sheep had some serious defects; they had too much belly and offal; their necks were too thick; and they had not the roundness and compactness of form which Bakewell so sedulously cultivated. Mr. Dexter had the good sense to perceive and acknowledge these defects, and he imported some valuable ewes from England, and selected with caution and care from his own flock, and at length obtained a breed scarcely or not at all inferior to that of Bakewell himself†. His zeal and skill were appreciated and rewarded. He too became a tup-letter, and obtained considerable prices for his rams: and at the present day, when a farmer wishes to improve his flock, he sends into Tipperary for a Dexter ram, and his object is certainly accomplished. Messrs. Lloyd and Going also deserve honourable mention in the early history of the Tipperary sheep. The management of the sheep in Tipperary does not differ from that in Kilkenny or the other neighbouring counties.

Chapter X.

THE ANATOMY AND DISEASES AND GENERAL MANAGEMENT OF THE SHEEP.—THE SENSORIAL FUNCTION.

That which is necessary to be known of the structure of the sheep, in order to understand the most profitable way of managing him, and of preventing or curing the diseases to which he is subject, will be most simply and intelligibly stated by considering the various functions on the proper discharge of which the existence and well-being of the animal depends, and the parts which are concerned in the right discharge of these functions. This review will naturally commence with the *nervous system*, the moving power of the whole machine.

The nervous system consists of *the brain*, to which all sensation is referred or carried, and from which all voluntary motion is derived—that mysterious organ, on which depends the consciousness of surrounding objects, the sensations of pleasure and of pain—and, extending through

* Townsend's Survey of Cork, vol. i. p. 254.

† "I doubt whether the Tipperary breed of sheep can be improved. The wool is good; it sells at 17*s.* 6*d.* per stone of 16 lbs. The clip is from 6 to 7 lbs., and the hogget from 5 to 5½ lbs. It is a fine large sheep, sometimes called the Dexter."—Mr. Robert's Agricultural Report, 1833.

more numerous species and lower grades of beings than some are willing to allow, the powers of the mind, and the capability of moral feeling.

The *spinal cord* or *marrow* may be considered as a prolongation of the brain, or as connected with it for important purposes. It is enclosed in a hollow tube, extending through the bones of the neck and chine; and as it passes along it gives out branches on either side, which divide and subdivide, and spread over every part of the frame. They are the *nerves of sensation and voluntary motion.* By means of them the sense of feeling is bestowed on every part of the body, and the mind is rendered conscious of every external impression or change; the volitions or determinations of the mind also are conveyed to the different portions of the frame, and the animal moves and acts as the will dictates.

At the posterior and lower part of the brain, where the substance and probably the influence of the cerebrum and the cerebellum, the great and the little brain, unite—the medulla oblongata—are the organs of other nerves connected with life itself, and governing all the involuntary motions of the frame. By means of them the lungs heave, and the heart beats, and the stomach digests the food: while from a situation out of the skull, but close to its base, arises another set of nerves, likewise belonging to life itself, and probably governing the functions of secretion and nutrition, and the repair and welfare of the body generally. A very brief survey will be taken of these important organs.

The brain of the sheep lies in an irregular oval-formed box, composed of the same number of bones, and bearing the same names as in the horse and the ox. The union between these bones is more intricate and dove-tailed, and stronger in this animal than in the horse or the ox, because, while the head of the sheep is destitute of that muscular covering and defence which may be observed in the horse, and destitute also of the greater part of that space and those long partitions which exist between the two plates of the frontal bones of the ox, it is the weapon of offence in the animal, whether horned or polled; and the violence of the concussion, when the sheep butt each other, renders great compactness and strength of bony covering absolutely necessary. It will be interesting to compare together the bones of the head in the horse or the dog with those of the sheep. The head of the one is not formed to withstand percussion, because it is not exposed to it; the other having a dove-tailing, serrated, deep, and intricate, beyond that which, for purposes of the greatest strength, is resorted to by man.

The form of the skull is also more arched than in either the horse or the ox, for the purpose of strength (pp. 109 and 384). The frontal bones occupy the same relative position as in these animals; but that portion of them which protects the brain, the parietal bones, and which forms almost the whole of the roof of the skull, is so depressed as to be out of all danger when the animals are butting each other (pp. 370 and 384). A very small portion only of that which actually covers the brain can receive the concussion of the rude encounter. If these bones, and the all-important organ which they cover, are not protected as in the horse by the yielding resistance of the temporal muscle, or as in the ox, by a multitude of bony pillars and partitions between the plates, they are more effectually preserved by being lowered out of the way of danger. This is an evident proof of design.

The horns of the sheep, like those of the ox, consist of an internal bony growth, being a projection from or prolongation of the frontal bones, and that covered by a horny substance denser than in the ox. The formation of this compound organ deserves more attention than has commonly been

paid to it. Two projections or tubercles may be seen on the young lamb, arising from the bones of the forehead, and covered by a portion of skin, unusually thick and hard. This skin gradually becomes more and more dense and insensible until it perfectly changes its character, and is converted into a hard, elastic, fibrous substance, to which we give the name of horn; and which continues to cover, and affords effectual protection to, the bony tubercles beneath. Between the horn and the bone is a delicate membrane, highly charged with blood-vessels, and from which curiously proceed both the bone and the horn. Its two surfaces have the power of secreting two altogether different structures; the inner one secreting the bone, which continues to increase in length and in bulk; while the exterior surface is adding new layers of horny substance on the inner side of that which has been already deposited.

This double manufacture is very singularly carried on at the same time and by the same membrane: the one a part of the frame, and continuing afterwards to be nourished by vessels forming a portion of the general system; the other a mere excretion, destitute of vessels, consisting merely of layers deposited in succession, and agglutinated to each other, and, once being formed, removed entirely from the influence of the living principle*.

The growth or excretion of the horn may well be supposed to differ in various points from the production of other parts that continue to be identified with the living system. There seems to be an alternate intermission and increase of the excretion, giving rise to certain irregularities on the surface of the horn, confined mostly to the base of it in the ox and the sheep, but extending through the greater part of it in the goat and the antelope. These rings are supposed to give some tolerable indication of the age of the animal: the irregularities, however, are influenced by various circumstances, and are too much at the control of human knavery in the ox. Still less dependence is to be placed upon them in the sheep; but the teeth, as has already been shown (p. 4), yield sufficient and almost unerring evidence with regard to the age of the animal.

It has been already stated that the primitive sheep were probably horned. Those which the Israelites possessed during their wanderings in the desert undoubtedly were so. The polled breed sprung from some accidental variety, and was cherished on account of the superior quietness of the animal and his aptitude to fatten. Of these points in modern sheep there can be no doubt. Half a century has scarcely passed since the rams of the Romney-marsh breed were all of them horned. At a little greater distance of time, the midland long-woolled sheep were horned. At the present day almost all the long-woolled sheep, and the best of the short-woolled are polled; and he would be a bad farmer who would endeavour to recall this useless appendage†.

* Roget's Animal and Vegetable Physiology, vol. i. 513.

† The best agricultural writers, two or three centuries ago, were strenuous advocates for the polled sheep. Sir Anthony Fitzherbert, in 1523, says, "The greater the horns of your ram the worse; for the pollard is the chiefest ram."—*The Booke of Husbandrie*, p. 46. Barnaby Googe, who wrote in 1614, says, "When he (the ram) knows himself to be armed, he will alwaies be fighting and unruly among his ewes. The pollard, finding himself unarmed, is milder and quieter by much; wherefore the shepherds, to restrain the rage of the unruly, doe use to hange before his hornes a little boord, with sharpe pricks inward, which keepes him from his madness, when he perceiveth himself to be hurt by his own blood. Others say, if you pierce his hornes with a wimble next to the eares, where they winde inward, he will leave his brawling."—p. 130.

Careful selection has succeeded much more perfectly with the pollard than the horned breeds of sheep, in rendering them contented with their pasture and harmless; but the want of horns is not always accompanied by good temper. There is a broad-tailed polled

In crosses of the Leicester and the black-faced sheep the horns speedily disappear. The first step is a singular one—they are moveable—they cease to grow from the frontal bone, and either adhere to the integument alone, or are superficially attached to the membrane of the bone below.

The Iceland sheep sometimes carry five or six horns. Three or four constitute the original number. Those which grow straight, or nearly straight, from the head, and which are seldom more than three, and never more than four, are projections or continuations of the frontal bones. Those which curl below the ears, like the horns of the cross just spoken of, either have their base embedded in the skin, or occupy circular cavities in the outer plate of the frontal bone, but do not form a part and portion of it*.

It is on account of the vascularity of the membrane just described that so much hæmorrhage and inflammation often ensue from a fractured horn; and that it is so necessary to stop the bleeding by the application of the heated iron, or to close up the opening with plasters of tar. The bone of the horn does not extend so far into it as in the ox; and fractures of the horn in sheep are usually nearer the base than they are in the ox.

THE BOT IN THE SINUSES OF THE HEAD.

Even in horned sheep the plates of the frontal bones are not so far separated from each other as in the ox, nor are the frontal sinuses so extensive (p. 384), yet the sheep is subject to an excessive annoyance, from which the ox is comparatively exempt. There is a fly of the *Diptera* order (flies with two wings, and behind them two globular bodies supported on slender pedicles, called, and properly so, poisers), the Œstrus Ovis, or Gadfly of the sheep. It assumes its perfect winged form in some uncertain period from May to July, and then is an intolerable nuisance to the sheep, especially in woody countries, and in the neighbourhood of copses. If only one appears, the whole flock is in the greatest agitation. They gather together, with their heads in the centre, and their muzzles buried in the sand, if they can find any, and are in continual motion, stamping with their feet, and snorting, in order to guard their noses against the assault of their puny enemy; then one of them, who is more especially attacked, will burst from his companions, and gallop across the field, looking fearfully behind him at every step.

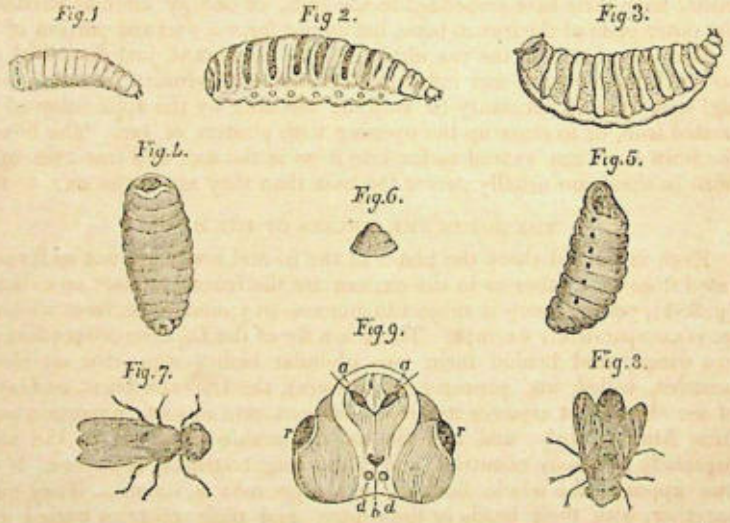
The œstrus, impelled by powerful instinct, endeavours to deposit its eggs on the inner margin of the nose. By the warmth and the moisture of the part they are almost immediately hatched, and the larvæ or little maggots crawl up the nose, and find their way to the residence which nature designed for them. In the act of passing up the nose they seem to give great annoyance; for the sheep gallop furiously hither and thither, and seem almost mad.

black ram at the present time in the Zoological Gardens, in the Regent's Park, that has floored most of the keepers, and is master over every sheep and every beast in the place.

There is some truth in the observation of old Ellis, especially when it is considered how large and heavy the horns of some sheep are, or used to be: "It is the pole sheep that are most beneficial to graziers, as they fat the sooner for having no horns, because the nourishment that should go to the horns is employed in fatting the carcase."—*The Shepherd's Sure Guide*, p. 45. There is one disadvantage, however, attending polled sheep, if they are not quiet,—that they can get through many a hedge in which the horned sheep would stick fast.

* A sheep was exhibited in 1754 having a horn growing from the throat, and adhering to the skin of that part. It was 2 feet 7 inches in length; 2 feet 2 inches in its greatest circumference, and weighed 15 lbs. There were no horns in the natural place, but only two stumps, like two small walnut-shells, laid on a flat surface.—*Gentleman's Mag.*, Nov., 1756.

Having traced their circuitous course through an aperture under the turbinated bone into the maxillary sinus, they sometimes lodge there; others proceed thence into the frontal sinus, and some reach the cavity of the bone of the horn (p. 384.) They are found occasionally in every cavity with which that of the nose communicates. When it has arrived at, or selected, its place of residence, the larva fixes itself on the membrane of the sinus by means of two tentacula or hooks, which grow from the side of the mouth; and there it remains, feeding on the mucus secreted by this membrane, from June or July to May or June.



1. The larva or bot of the œstrus ovis half grown. All these figures, except the last, are of the natural size.

2. The same at its full growth.

3. The under part of the larva, showing the tentacula, and the mode of progression.

4. The œstrus ovis in the pupa state.

5.—6. The shell after the fly has escaped, and showing the manner in which it was effected.

7.—8. The œstrus, giving a side and a full-length view of it.

9. The head of the œstrus, magnified, showing particularly the tentacula, and the apparent want of a mouth.

The larva is composed of eleven rings, which form a species of cone a little flattened. Fig. 1 represents it having attained about one-half of its growth. It is white, with the exception of two small brown patches by the side of each other at its tail; these are the posterior stigmata, which are sometimes erect, but generally enclosed within the last ring as in a purse. Below and in the same ring is the anus, concealed by some fleshy folds. On either side, as seen at fig. 3, is a fleshy appendage, the use of which is not known.

In fig. 2 it is represented at its full size, and it will be seen that it is larger than the bot of the horse, but smaller than that which is sometimes found in the warbles on the backs of cattle. The head is armed with two crotchets (see figs. 3 and 9); they are strong, and of a brown colour, and have the appearance of little horns. By means of them the bot attaches itself to the membrane of the cavity in which it is contained. The whiteness of the young bot has now partially disappeared. The most elevated of the

rings, and particularly of those reaching from the middle of the back to the tail, have gradually changed to a pale and afterwards to a dark brown; and on each ring are three or four round spots of a still darker colour. At the edge of each of the rings are a few short stems or bristles; and below them (see fig. 2) are some small rounded spots of a darker colour.

The fleshy portions between the rings on the belly of the larva are covered with small red spines, the points of which turn backward. They may be felt by drawing the finger lightly over the bot from the tail to the head. These spines probably assist in progression.

At some time between the middle of April and the end of July, these larvæ have attained their full growth, and seek to escape from their prison. They give great annoyance to the sheep while this is taking place, who again are continually stamping with their feet, and violently sneezing. It is rarely that the exit of the grub from the nose is seen, owing to the impatience of the sheep, and his tossing of the head and continual sneezing. They who would make themselves acquainted with the appearance of the bot must purchase some sheep's heads at this time of the year, and saw them open. A great many will be found without any bots; a great many others will have one bot, some will have two, and a few will have three. It is not often that that number is exceeded; although, in a few instances, the head of the sheep has contained nearly a dozen of them*.

When the worms are caught in the act of expulsion from the nose, or are taken in their perfect state from the cavities of a newly-killed sheep, they are very restless, and are continually marching, or rather dragging

* These worms are not confined to the sheep, but are found also in the sinuses of the head of goats and of deer. On their native mountains goats seem to suffer more from these bots than sheep do. The larva of the œstrus ovis was known in very ancient times. Alexander Trallien, a physician who flourished about the year 560, makes mention of these worms as a remedy against epilepsy, and of their efficacy for this purpose being indicated by Apollo himself. He says that an Athenian of the name of Democrates was tormented in his youth by frequent fits, until at length he consulted the oracle of Delphos as to the means of cure. The answer given by the Pythian priestess is differently reported. Trallien himself gives the following as the answer, changed, however, into Latin verse:—

"Quos madidis cerebri latebris procreare capella
Dicitur humores, vermem de vertice longum."

"Take the long worm from the crown, the humours which the goat is said to produce in the dark cells of the brain."

Others give a different version to the oracle:—

"De grege sume capræ majores ruris alumnæ
Ex cerebro vermes. Ovis, date tergora circum
Multiplici vermi pecoris de fronte revulso."

"Take, out of thy flock, the larger worms from the brain of the goat, the rural nurse; and thou, oh sheep! lend the hide that envelops thee to the worm expelled from the forehead of the herd."

Democrates was little *au fait* at the history of insects, and probably had never heard of the existence of the bot in the head of sheep and goats (Valisnieri, from whom Reaumur, and every succeeding naturalist, has borrowed much on this subject, says that he was unable to persuade the shepherds in his time that such a worm did really exist); and the more he thought of the response of the priestess the less he understood it; he therefore went to an old man, ninety-eight years of age, who, after poring a little over the enigma, suddenly broke out into expressions of admiration of the wisdom of the god. He told the inquirer that worms were bred in the heads of goats and sheep towards the base of the horn; that they were ejected during violent sneezing, and that he must endeavour to catch them in sheep-skins before they reached the ground; or, according to another interpretation, that he must string them on a piece of worsted, and wear them as an amulet round his neck.—Mémoires pour servir à l'Histoire des Insectes, par Reaumur, vol. iv. p. 556.

themselves rapidly along. When placed upon the hand, they find their way to the division of the fingers, and, using the points of their crotchets, they endeavour to force them apart. They soon get to the bottom of the loose earth or powder in the usual insect box; and if they are placed on the ground, and the soil is tolerably light, they very speedily bury themselves in it, and are lost. Those, however, that are not arrived at maturity will quickly perish for want of the nutriment from which they were too soon taken. Those that survive, in order to undergo their pupa state, form to themselves no artificial covering, but their skin gradually contracts and hardens around them. In twenty-four hours it begins to resist the pressure of the finger, and at the expiration of the second day the larva has become a perfect chrysalis. Fig. 4 gives an accurate representation of it. It is smaller than in its first stage of existence, but retains much of the same appearance, except that it has become of a more uniform brown black colour.

According as the season is more or less favourable, or in proportion to the warmth of the bed or the box in which the insect has taken refuge, the time of the pupa stage of existence is lengthened or shortened. M. Valisnieri states that a worm which he took on July the 5th underwent its final change at the expiration of forty days; but sixty-three days passed before one that he found in April became a perfect fly. Notwithstanding the hardness of the chrysalis, they seemed to escape from their prison with perfect ease. A small part of the head of the pupa becomes detached, and the fly creeps out. Figs. 5 and 6 give a sufficiently accurate idea of this.

The fly is considerably smaller than the size of the larva would indicate. Its head and corslet, taken together, are as long as the body; and that is composed of five rings, tiger-coloured on the back, with some small points, and larger patches of a deep brown colour. The belly is of nearly the same colour, but has only one large circular spot on the centre of each of the rings. See figs. 7 and 8, which represent the œstrus of the natural size and appearance. The length of the wings is nearly equal to that of the body, which they almost entirely cover. They are prettily striped and marked. The poisers are concealed by the small and shelly portion of the wings.

The head of the fly is singularly formed. It is large in proportion to the general bulk of the insect. The eyes have the appearance of net-work, and are of a deep and changeable green colour. They occupy less space upon the head than those of most other flies. In the small space between them are placed three other minute eyes, in the form of a triangle. They may be discovered in a tolerable light, or by a lens of small power. The rest of the head is yellow and seemingly hollow. It appears as if it were perforated by a great number of small holes, like a piece of sponge, and at the bottom of each of these cavities a small black spot appears. On the anterior and under part of the head are two short antennæ with large bulbous bases; see fig. 9. There are very few hairs on the head, but many on the body, sides, and legs. A little beneath, and towards the throat, are three little brown spots or projections, in the form of a triangle. The fly has neither proboscis nor teeth, and its mouth, if it has one, is between these tubercles, and immediately behind the superior one; but it has never been distinctly seen, and it is usual for naturalists to describe this fly as not taking any nourishment during its last and perfect state, but living merely for one purpose, the propagation of its species. It is, however, a negative account which must after all be given,—the fly *has never been seen to eat.* M. Valisnieri has repeatedly offered these insects sugar and syrup, but

they could not be induced to touch it, although he kept one of them more than two months.

The œstrus ovis is not the only fly which is believed to live for one important purpose alone. The same account is given of some species of butterflies, the male of which dies as soon as the female is impregnated; but she lingers on until she has found a proper receptacle for her ova, when she too expires, nature having denied to both of them the organs for the prehension and the digestion of their food.

The flies, both male and female, seem to be inert and sleepy beings: they will remain motionless on the side of the box for many a successive day. After the different sexes have been brought together, as it were by chance, the male resumes his motionless position for an uncertain time; generally but for a few hours—occasionally for some days—and then he dies; sometimes, however, having impregnated a second or a third female. The female likewise continues to exhibit the same picture of still life until her ova are ready to be produced. The flies are to be seen at these periods on the rails and walls in the neighbourhood of some flock of sheep, and the shepherd, and the shepherd's boy, should be taught to distinguish and destroy them.

Both French and English writers give a fearful account of the mischief which the larva effects in its dark abode. Gasparin* speaks of frequent convulsions, giddiness, and half unconsciousness, distinguished from turnsick by the violent sneezing with which it is accompanied. When the larva is creeping to its destined abode, and when, having reached its mature state, it is restless in its habitation, and seeking a way to escape, the sheep undoubtedly suffers considerable annoyance, which it manifests by stamping and sneezing; but otherwise, during the whole of the protracted abode of the insect in the sinuses of the head, there is no symptom by which its existence, much less the mischief which it is supposed to effect, can be ascertained. It may be supposed that when parasites like these find their way to cavities or parts of the frame which nature never destined for their habitation, the animal who unwillingly affords them shelter may be much inconvenienced, and serious disease may be set up; but it is incompatible with that wisdom and goodness that are more and more evident in proportion as the phenomena of nature are closely examined, that the destined residence of the œstrus ovis should be productive of continued inconvenience or disease. There are no indications of cerebral irritation in the sheep which may not be fairly traced to other causes; and the permanent comfort and health, much less the life, of the sheep, would not be sacrificed to so insignificant a being.

There are two ways in which it may be imagined that these bots are serviceable, rather than injurious to the sheep; and it is seldom that nature has recourse to expedients like those which have been described, except the benefit of both the parties concerned is promoted. Sheep are notoriously liable to determinations of blood to the head, and to inflammation of the brain. When a medical man suspects or is assured of this inflammatory disease in his patient, he endeavours to set up some counter-irritation, and in a neighbouring part; and he thus diminishes, or neutralizes, or entirely gets rid of the evil which he feared. Nature may possibly have placed this source of irritation, the presence, and sucking, and occasional motions of the bot in the frontal sinuses, or at the root of the horns, in order to prevent or to diminish the tendency to cerebral disease, to which the sheep would otherwise be subject. This is Mr. Clark's suggestion.

* Gasparin, Manuel d'Art Vétérinaire, p. 468. Hurtrel D'Arboval *Met.* Vero.

It should also be recollected that the sheep feeds close to the ground—much closer than does the ox; and therefore the nasal passages are exposed to annoyance, from the inhaling of dust and sand, and the intrusion of insects. Nature has given the ox a provision against this, in the abundant secretion of dew on the muzzle, and the singular length of the tongue, by which every nuisance may be washed and wiped away. The sheep has apparently no defence. May not this habitation have been assigned to the bot in order that, by his presence in the frontal and other sinuses, a certain but not injurious degree of irritation may be excited, which shall increase the mucous secretion, and by causing it to be constantly yet not annoyingly or injuriously flowing down the nose, carrying away the accumulating dust, and rendering the climbing of the insect more difficult or impossible. This, however, is all surmise; but it has a good foundation—the tendency of the instincts and habits of animals to the increase of enjoyment, and not suffering.

Doubting then the existence of the mischief supposed by some to be effected by the bot, it would be useless to speak of the remedy any farther than this, that the deposit of the larvæ in undue numbers should, if possible, be prevented; for in spite of all our efforts a sufficient, or more than sufficient number of them will find their way to this strange abode, and accomplish the design of nature. The shepherd should, therefore, be taught to recognize the fly and to destroy it.

The French and Spanish writers recommend the use of the trephine. It is true that the worm is generally found in the frontal sinus, but it is impossible to predict this with certainty. It has been found in the turbinated bones of the nose (fig. 13 and 14, p. 384); it may inhabit the sinuses of the jaw (fig. 17, p. 384), or it may have crept to the upper part of the bone of the horn (fig. 5, p. 384). If relief was ever obtained by the use of the trephine, it was not in consequence of the removal of the bot, but was attributable to the bleeding that was the necessary accompaniment of the operation, and by which the inflammation or congestion was diminished *.

The foramen or aperture in the bones of the forehead, for the passage of blood-vessels to supply that part, penetrates, as in the ox, through the frontal sinuses, both in the horned and polled breeds; and as the forehead of the sheep, like that of the ox, is comparatively larger than the same part in the horse, there are usually two foramina on either side; and the vessels, as they escape, sink into a sulcus or trench, along which they pass with perfect security. (See fig. 6, p. 370.) This is another illustration of design. In animals who use their heads as weapons of offence these blood-vessels would soon be injured and destroyed if they were not thus protected.

THE FORM OF THE HEAD.

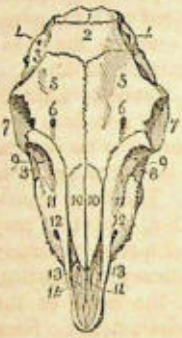
In order to afford space for the attachment or origin of the horns, the frontal bones project both forward and laterally, which gives the peculiar breadth of forehead and prominence of the eye to the sheep. This form of the upper part of the face is retained in breeds from which the horn has long ago disappeared; but it is most apparent in the English horned breeds, and more particularly in the many-horned breeds of foreign countries.

The orbitar process of the frontal bones, or that process which contributes to the formation and the strength of the zygomatic arch in the horse (see

* The French reader is referred to "Mémoires pour servir à l'Histoire des Insectes," par Reaumur, vol. iv. p. 552; and the English reader to Mr. Bracy Clark's Essay on the Œstrus, in the third volume of the Linnæan Transactions, and which is the most satisfactory account of these bots which has yet been published.

p. 66, Horse) does not in the sheep, any more than in the ox, enter at all into the composition of this arch, because in the ruminant the food is more leisurely masticated, and the teeth are not the weapons of offence, and therefore peculiar strength is not needed; and also, because the side of the head is not in these animals exposed to the violence and injury from which the horse occasionally suffers.

THE SKULL OF A POLLED SHEEP.



1. The occipital bone depressed out of the reach of danger.
2. The parietal bones, the suture having disappeared, and also out of danger.
3. The squamous portions of the temporal bone—the buttress of the arch of the skull.
4. The meatus auditorius, or bony opening into the ear.
5. The frontal bones. [forehead.
6. The openings through which blood-vessels pass to supply the
7. The bony orbits of the eye.
8. The zygomatic or molar bones.
9. The lachrymal bones, very much developed.
10. The bones of the nose.
11. The upper jaw-bone.
12. The foramen, through which the nerves and blood-vessels proceed to supply the lower part of the face.
13. The nasal processes of the intermaxillary bones.
14. The palatine processes.
15. The intermaxillary bone, supporting the cartilaginous pad, instead of containing teeth.

The bones of the skull are thus disposed of in the sheep. The frontal bones occupy the whole of the broad expanse on the top of the head, extending from eye to eye. (See fig. 5.) They are prolonged as far below the eye as above it, encroaching upon and materially shortening the nasal bones (10,10). Above, they reach to the parietal bones (fig. 2.); but, before they arrive at this point, the head takes a sudden inclination downwards, and a little of the posterior part of the frontal bones, that which is most concerned in covering the brain, is out of the reach of danger. See also the cut, p. 384.

The concussion is tremendous when these animals rush against each other in good earnest; but from the peculiar arched form and the strength of the bones which come in contact here, and the depression of the greater part of the brain far below, serious mischief is seldom effected. The horn is occasionally broken; the ribs, the limbs, may sometimes be fractured; at the rutting season the contest may end only with the death of one of the combatants; but it is comparatively seldom that the skull is fatally injured.

The *parietal* bones of the sheep (fig. 2), although not elevated to the summit of the arch, as in the horse, yet resume the function of which they were deprived in cattle. They constitute an important part of the posterior and slanting division of the skull, and have the same dense and firm structure which they possessed in the horse. At an early period of the life of the animal they are formed, as in the horse and cattle, of two distinct bones; but the suture between them soon disappears in the sheep, and they become one continuous bony arch over the greater part of the brain. Considerable strength is necessary here in order to sustain or neutralize those violent concussions which may occasionally be propagated from the frontal bones above.

The *squamous* portion of the *temporal* bones is seen at fig. 3, at the base of the arch, overlapping the lower part of the parietal bone, forming a

kind of buttress, and so contributing to the strength of the structure. The situation of the *petrous* portion is marked by fig. 4, where is the *meatus auditorius externus*, or bony passage leading to the ear.

The *occipital* bone (fig. 1), forming the posterior and firmest base of the cranial arch, may be traced at the edge of the parietal bones: and, constituting the floor of the arch, but not seen in this cut, are the *ethmoid* and *sphenoid* bones—the former placed anteriorly, and the latter posteriorly.

THE IMPORTANCE OF THE SIZE OF THE HEAD.

The head of the sheep constitutes one of the principal points by which his quality and profitableness may be judged of. Compared with his general size, it should be small, and, particularly, not wide between the eyes; too great width of forehead is an invariable proof of inaptitude to fatten, at least externally. The sheep with a large head will be a favourite with the butcher, because in proportion to the slowness with which he gets into condition will be the accumulation of fat within, even if there was no natural tendency to produce tallow: in other words, there will be more profit to himself at the expense of the grazier and the consumer. The head should be small, thin, and short. It is possible, yet not probable, that this may be carried to too great an extent; but that head must be disproportionately small which can be considered as a proof of too great delicacy of constitution. There is considerable danger in lambing when the head of the sheep is large, for the lamb will generally possess the characteristic form of the sire. Mr. Price relates an anecdote which well illustrates this principle. "A grazier in Appledore," says he, "employed Leicester rams for several years, and obtained a breed with very small head and kindly disposition; but he objected that they were not large enough, and did not fetch a good price at market; he therefore, in the summer of 1804, hired some large Kentish rams, to give him size, as he called it. In the following lambing time he lost twelve ewes in lambing, from the largeness of the lamb's heads, and he was obliged to draw almost all his young ewe lambs. In 1806 he had the same difficulty to encounter, and his loss amounted to nine ewes out of 250, from this cause alone *."

The sheep often suffers much from the fly attacking the head; but this will be best considered when the general mischief occasioned by the fly is taken into consideration.

SWELLED HEAD.

The sheep, browsing so close to the ground as it does, is sometimes subject to swelled head from being stung by vipers, and occasionally by venomous insects. The wool should be cut off round the wound, which should then be well washed with warm water, and afterwards plenty of olive oil should be rubbed in, and small doses of hartshorn diluted with water administered internally: half a scruple of the hartshorn in an ounce of water will be the proper dose, and should be administered every hour.

The Ettrick Shepherd describes a disease of the head among the Scottish sheep, almost or quite unknown south of the Tweed. He says that on some of the Kells hills in Galloway, and on some of the most easterly of the Grampian mountains, and also in the forest of Skye, such of the sheep as frequent the bare tops of the hills, except they are driven from them every night, are subject to a disease called *the great head*. It seems to be an affection of the cellular substance beneath the skin—the head rapidly en-

* Price on Sheep, p. 44.

larges, and at length an abscess is formed: after this the sheep quickly recovers, unless he is worn down and destroyed by the profuseness of the discharge.

"On the mountains around Cairn Gorm and Lochavin, the natives ascribe it to an amusing, but very ridiculous cause. They say that a most deformed little monster inhabits the tops of these mountains, whom they call *phaam;* that he is very seldom seen, but whenever he is seen, it is very early in the morning, immediately after the break of day; his head is larger than his whole body—his intents are evil and dangerous—and he is no earthly creature. If any man or animal comes near to the place where he has been, before the sun shines upon it, the head of that man or animal will immediately swell enormously, and death will often follow, after very great pain has been endured. The baneful influence of this elf or goblin is often very severely felt among the mountain flocks*."

The most probable way of accounting for this is either to suppose it occasioned by some poisonous herbage that grows on these mountains, but the precise nature of which has not yet been ascertained, or to consider it as one of those species of catarrh or influenza, such as would be likely to prevail in these desolate wilds, and a not unfrequent symptom of which is sudden and great enlargement of the head and throat, threatening speedy suffocation. This is usually followed by one or more abscesses, the discharge from which is profuse, and the signal either of the commencement of recovery or of gangrene and death. A disease of this character is sometimes epidemic among horses.

THE BRAIN.

Enclosed within the bones that have been described lies the brain. It possesses the same form as in the horse and the ox, but is a little more prolonged in proportion to its size, and broader posteriorly than anteriorly. On looking attentively at it, it is perceived to be a little larger, in proportion to the size of the animal, than is the brain of the ox; and, in point of fact, the brain of the ox is about 1-800th part of the weight of the animal, while the brain of the sheep is 1-750th. This important organ is in the sheep, as in the animals already treated of in this series, composed of two substances, very different in appearance and structure—the one, from its situation on the outside of the brain, termed the *cortical*, or from its reddish *ashen* colour, the *cineritious* substance; and the other, found more deeply within the brain, and termed, from its pulpy nature, the *medullary substance*. (See cut of the section of the head, p. 384, fig. *a* and *b*.)

These two substances, according to the opinion of the best physiologists, discharge two distinct functions: the cineritious is connected with the mind—it possesses the faculty of receiving impressions from surrounding objects, and of generating or producing power; the medullary substance conveys the external impression and the mandates of the will;—the one connected with *intelligence* and *power*, the other being little more than a *conductor*. The proportion of the two substances appears to be nearly the same in the sheep as in the ox, or, if there is any difference, the projections are bolder, and the layer of cineritious substance is proportionably deeper, in the sheep than in the ox.

THE INTELLIGENCE OF THE SHEEP.

Does this imply that the intellectual power is greater in the sheep than in the ox?—Experience and observation would not justify this conclusion.

* Hogg's Shepherd's Guide, p. 113.

The education of the two animals, however, is not alike: the one is trained to be the servant and, in a manner, the companion of man, in more respects than one; much kindness is often bestowed upon him, and his education is conducted with considerable care and labour: our connexion with the other extends no further than driving him to and from his pasture, and that at the expense of much fright and occasional injury, and subjecting him to painful restraint and sad fright when we are depriving him of his fleece. The intellectual faculties of the one are systematically cultivated, whether in the dairy or at the plough—those of the other are as systematically depressed.

If, however, we look at the sheep either in a state of nature, or by peculiar circumstances roused to the exercise of his powers, he is not so "*silly*" as some have represented him to be. The Mouflon, the wild sheep, is an intelligent and courageous animal, capable of escaping, by artifice and swiftness of flight, from his larger foes, or of beating off his smaller enemies, by a dexterous use of the weapons that nature has given him. Even in his domesticated state, if a bull and a ram are placed in the same pasture, the latter, from the very commencement, will submit to no injury or insult, and if provoked to serious combat will rarely fail to beat his gigantic opponent. In the gardens belonging to the Zoological Society of London is a beautiful and powerful Brahmin bull; he is managed with tolerable ease by his keepers, but he often shows to visiters who are inclined to be too familiar, that he is not to be approached without danger. It is sometimes necessary to place a ram in the same house and paddock with him; the question of mastery is almost uniformly to be tried before they can quietly associate together, and in every case he has been beaten by his lesser antagonist. Like cattle generally, he holds his head low, and, receiving the furious butt of the ram full on his forehead, he very soon withdraws from such violent and painful concussions.

The domesticated flock of sheep, whatever show of resistance they may occasionally make, are usually put to speedy flight by a determined individual—all except the ewe, who, contrary to the assertion of Buffon, remains with her lamb, and braves all danger in its defence; but in proportion as the sheep are withdrawn from the control and protection of man they become courageous. In some of the northern parts of the kingdom they range on extensive mountains, and are scarcely seen during many successive weeks. A ram will then boldly attack a single dog, and generally be victorious. Should several foxes or strange dogs come in sight, the sheep adapt their defence to the degree of danger. They form themselves into a compact body, placing the females and the young behind, while the males take the foremost ranks, keeping closely by each other, and presenting an armed front to their enemy. In this order they advance upon their assailants, and when they have come within a certain distance, the rams rush forward, and generally destroy their foe *.

Mr. Hall, in his "Travels in Scotland," relates a ludicrous yet somewhat serious encounter which he had with a flock of sheep there. "I was one day," says he, "climbing the mountain of Belrinnis. On reaching the top I found myself in a cloud, whence I could not see any object distinctly at the distance of more than a few yards. As there was a fine breeze I hoped that the cloud would disperse; and although I felt exceedingly cold and hungry, I resolved to remain there a little while. While I was walking about to keep myself warm, I perceived something

* Illustrations of Natural History, p. 110.

of an uncommon appearance at a little distance from me, and I approached it, not indeed without fear. I found it to be a phalanx of sheep drawn up on the top of the hill, and ready to defend themselves against attack. They were arranged in a kind of wedge, presenting its blunt end foremost; in the middle of the line was a large ram, with a black forehead and a tremendous pair of horns; a number of weaker ones were in the rear, not one of them eating, but looking sternly upon me. I was not at first afraid, knowing them to be only sheep, and yet I was not perfectly easy, for if any fox appeared, they might kill me in chasing him.

"These sheep had been sent into the mountain, in April or May, where the owners seldom look after them until October. When they gather themselves together at night, one of them is always placed at a little distance as a sentinel. They never descend into the valley at night, or rest in any low and sheltered place, but, even in the most stormy weather, they are on the top of the hill or on rising ground, and if they are attacked by foxes or dogs, their assailants rarely fail to pay for their temerity with their lives*. Seeing them, however, in this warlike array, I began gradually to feel a little alarm, and deeming discretion to be the better part of valour, I slowly retired. As the distance between us increased, their line was neither so straight nor compact; but if I stopped, and again advanced a few steps towards them, they looked steadily at me, and formed their line with greater precision and closeness, and had I attempted to attack them, I am convinced that they would have resisted. I had once a great mind to try, but I confess that my courage failed me when I observed them seemingly bending their knees in order to make one simultaneous rush upon me." It is education and habit only that have made the sheep a coward.

ATTACHMENT TO EACH OTHER.

There are few animals who form so steady and permanent an affection for each other. There is scarcely a flock in which the same sheep are not always seen side by side searching for food, or ruminating in the fold; hence the practice of including them all if possible in one fold at night, that the friends may not be parted. Some careless shepherds are inattentive to this. A writer in an agricultural periodical gives them some very good advice on this point. "Here I shall observe,—and the observation ought to have its due weight with the shepherd in the disposal of his flock during the night,—that the sheep which have been together during the day, and have been making eager and joint exertions for a scanty subsistence, and have alternately sheltered each other from the biting blast and the suffocating drift, and by their perseverance and mutual endeavours have stimulated and supported each other during the day, and have become endeared to each other, should not be separated at night. Their being forcibly parted in the division of the flock has frequently been productive of a degree of alarm and distress that could scarcely be conceived possible:

* An inclination to congregate on the tops of the hills, through the darkness and silence of the night, is nearly as powerful a sentiment as any that actuates the sheep in his wild state; and also when, in his domesticated one, he is much left to his own resources and habits in a mountainous country. It may not be so evident during the short nights of summer; but, at the approach of winter, when it would be thought that they would look about for some comfortable shelter from the storm, they eagerly seek the highest and most exposed situation in their walk. Without the exception of a single sheep, they collect themselves on the summit of their respective hills. No snow can overwhelm them there, and no foe can steal upon them unobserved.—Edinburgh Farmer's Magazine, Feb. 1824.

kindness and attention to their young. I once herded two years on a wild and bare farm, called Willenslee, on the border of Mid Lothian; and of all the sheep I ever saw, these were the kindest and most affectionate to their young. We had one very bad winter, so that our sheep grew lean in the spring, and the thwarter-ill came among them, and carried off many. Often have I seen these poor victims, when fallen down to rise no more, and even when unable to lift their heads from the ground, holding up the leg to invite the starving lamb to the miserable pittance that the udder could still supply."

"It is well known that it is a custom with shepherds, when a lamb dies, if the mother has a sufficiency of milk, to put another lamb to her. This is done by placing the skin of the dead lamb upon a living one, and thus acquiring something of the smell of her own progeny, and being put to her in a dark confined place, she accepts and nourishes it as her own. If it does not speak much in favour of her intelligence, it illustrates her maternal affection, that after the supposititious one has sucked her two or three times, such is her joy at the supposed recovery of her young one, that she bleats over it, and caresses it, and shows even more fondness for it than she formerly did for the one that was really her own. When a lamb has died, I never needed to drive home the ewe with dogs, or to use any other means than the following:—I always found her standing with her head over her dead lamb, and having a piece of twine with me for the purpose, I tied it to the lamb's neck or foot, and trailing it along, the ewe followed me into any house or fold that I chose to lead her. Any of them would have followed me in that way for miles, with her nose close on the lamb, which she never quitted for a moment, except to chase my dog, which she would not suffer to walk near me. I often, out of curiosity, led them in to the side of the kitchen fire by this means, and into the midst of servants and dogs, but the more that dangers multiplied around the ewe, she clang the closer to her dead offspring, and thought of nothing whatever but protecting it *."

The following anecdote is perfectly authentic:—"A drover being on his way to Smithfield market with a flock of sheep, one of them became so sore-footed and lame, that it could travel no farther. The man, wishing to get rid of the impediment, took up the distressed animal, and dropped it over the pales of a paddock belonging to Mr. O'Kelly, and where the celebrated race-horse Dungannon was then grazing, and pursued his journey, intending to call for the sheep on his return, believing that, after a little rest, it would quickly recover, and which was the case. A strong attachment, however, soon grew up between the two inhabitants of the paddock: the horse would playfully nibble the neck of the sheep, and, without hurting it, would lift it into the manger of a neighbouring shed belonging to the field, as much as to say, although you are not able to reach it I will help you to the banquet: besides this, the horse would, on all occasions, protect his new friend, and would suffer no one to offer him the slightest molestation. Mr. O'Kelly, having been made acquainted with these circumstances, bought the sheep, and left the two friends in peaceable possession of the paddock and its adjoining shelter †."

Enough has been stated to vindicate the sheep from the charge of stupidity and want of common feeling that has been so wrongly brought against him. One peculiarity, and most strikingly evident in the compara-

* The Shepherd's Calendar, vol. ii. p. 189.
† Illustrations of Natural History, p. 132.

tively wild and aboriginal breeds, should perhaps be noticed—their attachment to the place in which they were bred. This was hinted at when the Welsh sheep were described (p. 266); it is more evident in the wilder sheep of the black-faced and Highland breeds; it seems to be always a powerful principle with them, but it prevails most at the time of yeaning. There is something very interesting and consistent with natural feeling in this. "A black ewe that had lately lambed was missed from the farm of Harehope in Tweeddale. A shepherd was dispatched in pursuit of her, who traced her many a mile, and then abandoned the chase. He was told that she had been several times stopped, but that she absolutely persisted in travelling on, regarding neither sheep nor shepherd by the way. Her lamb was often far behind, and she had constantly to urge it on by impatient bleating. She unfortunately came to Stirling on the morning of a great annual fair, about the end of May, and, judging it imprudent to venture through the crowd with her lamb, she halted on the north side of the town, lying close by the roadside during the whole of the day: but, next morning, when all became quiet, a little after the break of day, she was observed stealing quietly through the town, in apparent terror of the dogs that were prowling about the streets. The last time she was seen on the road was at a toll-bar near St. Ninian's. The man stopped her, thinking that she was a strayed animal, and that some one would claim her. She tried several times to break through by force: when he opened the gate, but he always prevented her, and at length she turned quietly back. She, however, found some means of eluding him, and got home at last, having been no less than nine days on the road. Her former master paid the price of her, and she remained on her native farm until she died of old age in her seventeenth year*."

PRESSURE ON THE BRAIN.

While it is a singular but undoubted fact, that considerable portions of the cineritious part of the brain may be cut away, and the animal is scarcely conscious of the act, the smallest pressure cannot be made on the base of the brain without impairment of consciousness and the power of voluntary motion. That pressure may proceed from some external cause, or from one existing within the cranial cavity. The principal or only cause of external pressure would be from

FRACTURE OF THE SKULL.

This is frequently accompanied by depression of a portion of the skull, and forcible pressure on the brain, oftenest occurring on the superior part of the cranium, but occasionally in its base. It has, however, been stated, that the form of the cranium in the sheep, and the situation of the greater part of its roof, out of the reach of danger, will render fracture of the skull a circumstance of unfrequent occurrence in this animal. The cause of pressure lies within the skull, and rarely admits of cure. The most frequent is the presence of hydatids between the membranes of the brain, or more or less embedded in its substance.

TURNSICK, OR HYDATID ON THE BRAIN.

Many strange, yet not altogether unmeaning, terms are given to this disease, as the gig, goggles, turn, turnsick, sturdy, giddy, dunt, &c. After a

* The Shepherd's Calendar, vol. ii. p. 186.

severe winter, and a cold and wet spring, many of the yearling lambs, and particularly those that are weakly, exhibit very peculiar symptoms of disease. This usually appears during the first year of the animal's life, and when he is about or under six months old. It is said to be occasionally congenital, and even the fœtus in the womb has been affected by it. It is far less frequent during the second year than the first, and after that period the sheep seem to have acquired an immunity against the attack of the hydatid.

The symptoms are as follows:—The sheep cease to gambol with their companions—they are dull—they scarcely graze—they ruminate in the most languid and listless manner—they separate themselves from the rest of the flock—they walk in a peculiar staggering vacillating way—they seem at times to be unconscious where they are, or they seek some ditch or brook, and stand poring over the ruffled or flowing water; they stand there until they appear to be completely giddy, and suddenly tumble in. In the midst of their grazing they stop all at once, look wildly around as if they were frightened by some imaginary object, and start away and gallop at full speed over the field. They lose flesh; the countenance becomes haggard; the eye wanders, and assumes a singular blue colour. This last circumstance, although not observed so carefully as it ought to be, is perfectly characteristic of the disease; and a clever shepherd would select every *sturdied* sheep from the flock, guided simply by the colour of their eyes.

This evident cerebral affection increases; the animal begins to carry his head on one side, and almost always on the same side. It is with difficulty that he can straighten his neck in order to graze, and there is a peculiar undecided motion in the act of grazing. The fits of wandering become more frequent; he is oftener frightened without apparent cause; he takes an increasing pleasure in poring over the rippling brook; there is something in the playing of the light on the water, or in the murmuring sound, which has a lulling influence over him, and he oftener forgets himself, and perhaps falls in and is lost.

By and by the sturdied sheep commences a rotatory motion, even while grazing, and always in one way, and with the head turned on the same side. This occurring, he almost ceases to eat or to ruminate, partly because the disease, from its debilitating character, destroys the appetite altogether; and also because he cannot restrain those circular motions, during which it is almost impossible to graze: but principally because he is rapidly becoming blind. He begins to be inattentive to surrounding objects, and he moves among them as if he were unconscious of their existence. The habit of turning round increases: he continues to form these concentric circles for an hour at a time, or until he falls; and then he scrambles up again, and commences the same strange motion. At length he dies emaciated and exhausted; or his death is hastened by his falling down some dangerous declivity, or his being unable to extricate himself from the brook or the ditch.

Turnsick can scarcely be confounded with inflammation of the brain, when the anxious yet half-vacant countenance, the absence of furious delirium and of all desire to do mischief, are regarded. If the sheep is galloping wildly about, it is evidently to avoid some imaginary evil, and not to encounter a supposed foe.

It may be distinguished from rabies by nearly the same symptoms, and particularly by the absence of all desire to injure its companions.

It can scarcely be confounded with apoplexy or inflammatory fever, for they usually attack the flower of the flock, while the comparatively debili-

tated sheep is the prey of the hydatid. The victim of these diseases can scarcely be induced to move; the sturdied sheep is wandering about or scampering everywhere, without apparent motive or object. The progress of apoplexy and inflammatory fever is rapid, and a few hours decide the fate of the patient; the sturdied sheep will linger on during several successive weeks. The one dies in full condition—the other wastes away to a mere skeleton.

On examining the sheep after death, an hydatid, or many hydatids, are found between the pia-mater and the brain, or imbedded in the cerebral substance. The existence of these hydatids has been doubted in the human brain*. There is, however, no doubt about the matter here; they are true hydatids, but of a very singular structure, and such as have not yet been observed in the human being.

They belong to the CŒNURUS, or the HYDATIS POLYCEPHALUS CEREBRALIS, *the many-headed hydatid of the brain*. Instead of a single head there are a great number spread over the surface of the parasite, and opening into the same general cavity. When the sac is distended they appear only as opaque spots upon it†; but a lens of no great power will give a distinct view of their heads, or rather necks, with the tentacula or barbs projecting from the apparent opening or mouth which forms the extremity of them. These hydatids vary in size from that of a pigeon's to a hen's egg.

The wall of the cyst appears to be composed of two or three layers, the centre one of which seems to possess a muscular character. On examining them with lenses of a high magnifying power, "their coats resemble paper made upon a wire-frame, the muscular fibres so plainly and regularly interlacing each other."

When the hydatid is first extracted and placed in warm water it has an evident vibratory motion; and if then punctured, the contained fluid will be ejected to a considerable distance in consequence of the powerful contraction of the muscular coat. The inner membrane is clearly marked with rugæ, which have considerable resemblance to the villous membranes of the stomachs of many animals.

This cyst or bladder contains a fluid, sometimes as pellucid as water. If the internal membrane is then examined, and particularly with a lens, a countless multitude of little bodies, resembling eggs, and disposed in regular lines, will be found to adhere to it by filmy particles; but the fluid will not contain any organized body. At other times the water within the cyst will be turbid, and will contain innumerable portions of apparently fibrous matter, but which, submitted to the power of a microscope, are resolved into so many minute worms. If the fluid is very turbid, that is caused by the immense quantity of the worms, and the eggs will all have disappeared; when the turbidity is not so great, many of the eggs will still be observed adhering to the cyst.

These worms are about half a line in length. The head is in the form of a tetragon, with a circle of rays or tentacula at its summit, and a mouth on each of the four sides of the head. The neck is short, and the body is covered with rings or wrinkles. They appear to swim with great velocity, and to be possessed of much activity. They have also the peculiar property of issuing at pleasure from and returning to the cyst which they inhabit. If

* After enumerating various names on the one side and the other of the question, Dr. Copland, in the article on the BRAIN, in his excellent "Dictionary of Practical Medicine," says, "Whether these bodies were entozoa or mere hygromalous tumours or cysts, must rest on the pathological reputation of the physicians."—§ 124, p. 225.

† Roget's Animal and Vegetable Physiology, vol. ii. p. 84.

the cyst is removed whole from the brain, hundreds of them may be forced through the numerous heads of the hydatid by the slightest pressure; and at other times, when the cyst is examined, numbers of them will be found in or protruding from its various necks.

It is not uncommon for a very great number of small hydatids to be found floating in a larger one, seemingly the parent of the colony. The writer of this treatise was examining a monkey that had died of some obscure disease. Between the peritoneum and the abdominal wall he found an hydatid larger than the egg of a goose. He endeavoured to extract it whole, but it broke, and its contents flowed over the table. They consisted of an immense number of hydatids. He mentally divided the surface of the table into a certain number of compartments, and on counting the number of globules which one of them contained, he found that the whole would consist of considerably more than ten thousand. In addition to these he found an almost countless number of granules or vesicles on the rugous lining surface of the hydatid, and which were probably the germs of future hydatids. But there are few or no instances of this production of worms and such a provision in the parent for their habitation and protection. It somewhat resembles the pouch of the kangaroo and the opossum, or the stomach of the viper.

Are these worms hydatids in one of the forms which they assume, or are they parasites which take possession of the cyst appointed by nature for their residence? What object are they accomplishing in this their strange abode? The ovum, or germ, may be floating in the atmosphere, or received with the food, and, like some other *entozoa*, and more particularly the worm in the eye of the horse and the ox, may thread the various blood-vessels, whether of a larger size, or the minutest capillaires, until it arrives at its destined nidus or residence—the brain of a weakly sheep. Are there certain conditions of the brain under which these parasites may be spontaneously produced? If so, what are the laws and conditions of these productions? or why should their appearance be confined to the very youth of the animal and a state of general debility, if not disease? These are mysteries which future observers, perhaps, may be enabled to unravel*.

If there is only one hydatid, and it is suffered to attain its full growth, or, in other words, if the disease is permitted to take it course until it has destroyed the sheep, it will probably be of very considerable size, and a great portion of the brain will be absorbed. Mr. Stephens related the following history of a case at one of the meetings of the London Medical Society. A sheep with sturdy or turnsick was brought to him. He took out a portion of the skull with a trephine, and on cutting through the dura mater a very large hydatid partially protruded. He attempted to extract it whole, but it broke. He afterwards extracted the cyst, and on looking into the opening made with the trephine, he found the interior to present a large empty cavity. The brain appeared to be completely gone. He let down a wax-light through the opening into the cavity of the skull, when it appeared that nearly the whole of the brain was wanting. The hole was closed, and the sheep got up and fed, but in the morning of the fourth day it became convulsed and died. Upon opening the head a little only of the brain at its base was found, and some remains at the sides, forming an imperfect shell of brain, and there were several hydatids remaining†.

* The reader will find this worm figured in the second volume of Rudolphi's valuable work on intestinal worms, plate xii.

† Lancet, 1830-1, vol. i. p. 763.

If there is only one parasite inhabiting the brain of a sturdied sheep, its situation is very uncertain. It is mostly found beneath the pia-mater, lying upon the brain, and in or upon the scissure between the two hemispheres. If it is within the brain, it is generally in one of the ventricles, but occasionally in the substance of the brain; and, in a few instances, in that of the cerebellum.

These hydatids are probably exceedingly small when first deposited in the brain, and they produce little disturbance there. No altered function will tell of their presence, except that the sheep will sometimes be dull, and will eat lazily, and without appetite, or will stop in the middle of his eating, and seem confused and lost. When, however, they have attained a considerable bulk, and press upon the neighbouring vessels, or the origins of the cerebral nerves, their presence can scarcely be mistaken; and an accurate knowledge of the anatomy of the brain, and careful observation of the patient, will enable the practitioner to guess at the situation of the parasite. If the head is held constantly on one side, and the concentric circles are always formed in that direction, the cyst will be found on the depressed side, and probably in the lateral ventricle. If the head is sometimes held on one side, and sometimes on the other, and the circles are occasionally in one direction, and then in a contrary one, there is an hydatid on each side of the head, and probably in the ventricles. If the sheep marches straight forward with his head depressed, running against everything in his way, and continually falling, it is likely that the parasite occupies the middle scissure of the brain, and is attached to the corpus callosum. In a few cases the muzzle will be elevated and the head thrown back, the animal still pursuing its straightforward course, except that there will be a reeling motion, sometimes to the right, and sometimes to the left, like a boat at sea; the intruder then inhabits the cerebellum or the fourth ventricle *.

Possibly, however, there are more cysts than one, and these occupy very different situations in the brain. In that valuable periodical just referred to, an account is given of two sturdied sheep, in the brain of each of which four vesicles were found. In one of them the principal hydatid occupied the right ventricle, and smaller ones were found between the hemispheres, and in the fourth ventricle and the ethmoidal cell, or digital cavity. In the other, the principal one was found in the digital cavity; and the others in the right side of the fossa sylvii, under the pia-mater, on the left lobe of the brain and in the cerebellum †. In these cases the indications during life would be obscure, and no operation would be of service.

This is a singular disease; but it is a sadly prevalent and fatal one in wet and moorish districts; yet it will be seen by and by that this is the mildest of the scourges which the sheepmaster brings upon his flock by the neglect of draining. It is scarcely known in airy and upland pasture, or even in the lower grounds that have been thoroughly drained.

It is much more fatal in France than in Great Britain, on account of the general neglect of the sheep, and the almost total omission of this indispensable operation in well-conducted sheep husbandry. Perhaps also much may be attributed to the neglect of the young sheep, and not a little to here-

* Journal de Méd. Vét. Théorique, 1833, p. 429. The French divide the sturdied sheep into three classes, according to the manner in which they move, and then speak of the Turner, the Trotter, and the Sailor.—Gasparin, Manuel d'Art Vétérinaire, p. 438.

† Journal de Méd. Vét. Théorique, 1833, p. 168.

ditary predisposition *. It is supposed that nearly a million of sheep are destroyed in France every year by this pest of the ovine race †.

Veterinary writers, and agriculturists too, differ as to the cause of this fatal malady. Some have attributed it to the poisonous effects of certain plants; but these plants have never been clearly pointed out: others have seen a great deal more evil than really exists in exposure to hoar frosts. Some have considered it to be a species of serous apoplexy; others as the result of an accumulation of fluids in the ventricles of the brain; and some have traced it to violent blows on the head, either inflicted by a brutal shepherd, or in the playful or serious contests of the animals with each other.

Among modern writers, Mr. Price considers it to arise from local weakness of the membranes of the brain; and that in consequence of this local debility the membranes become distended with fluid when the animal holds his head so low as he is compelled to do in the act of grazing. The answer to this is, that repeated examination has proved that it is an animal, an hydatid, and not a mere distended membrane, which occupies certain portions of the brain in this disease ‡.

Mr. Hogg, a very useful and valuable writer, believes that it is an excess of fluid injected into the brain from the central canal of the spinal column: and another writer, adopting a similar opinion, affirms that it results from the lambs not being docked at a sufficiently early period; for "sometimes the ewe, in the ardour of her maternal affection, chews away the tail from her newly-fallen lamb, and none of these are afterwards affected by the sturdy; whereas when lambs have been docked late, a quantity of water has been found lodged in the root of the tail, which may sometimes increase, and proceed along the spinal marrow until it makes its final lodgment in the brain." Unfortunately for these gentlemen there is no communication between the centre of the spinal marrow and the brain §.

Turnsick, then, consists in the presence of one or more vesicles in or on the brain, and the pressure which they occasion on the medullary substance at the base of the brain, producing loss or perversion of the mental faculties, a species of idiocy, if the term may be applied to a brute: and when the substance of the brain begins to be inflamed and softened and lost, the organic functions are altogether perverted or impaired. If the animal escapes the accidents to which he is exposed in this state of mental alienation, he becomes debilitated and emaciated—he wastes away and dies.

* The author is bound to record the testimony of those who differ from him in opinion on this point. Mr. Parkinson, who is a man of very considerable experience, says, "I have cured a great number of sheep, some of whom have afterwards bred many lambs, and I never knew an instance of the offspring being so affected. I do not believe that it is an hereditary disease. It depends on the season and state of the sheep at the time; and the strength of the constitution being restored, there is no reason to fear that the malady will be communicated to the offspring."—Parkinson on Live Stock, vol. i. p. 412.

There is a great deal of truth in these observations, yet Mr. Parkinson does not fairly meet the point in dispute. They are very, very few sheep whom he or any one else recovers from the sturdy. The question is, whether the offspring of a delicate and badly-managed flock are not constitutionally disposed to those diseases which depend upon or are aggravated by a debilitated state of the frame?

† It is frequent likewise in Germany; and some of their writers on agricultural and veterinary matters have computed that, on an average of the different states, fifteen sheep out of a flock of a thousand will die of turnsick in the first year of their age; five in the second year; two in the third; and only one in the fourth year. The most dangerous time in the first year is between the eight and twelfth month.—Gasparin, Manuel, p. 439. This confirms the statement which was made in page 378.

‡ Price on Sheep, p. 423.

§ Hogg on Sheep, p. 55; and Price on Sheep, p. 426.

The means of cure are exceedingly limited. They are confined to the removal or destruction of the vesicle. Medicine is altogether out of the question here. Neither the warm bath, nor "the mercurial friction," nor "the repeated dose of physic," recommended by various writers, can have the slightest effect. Veterinary surgeons have hitherto been little employed in the treatment of turnsick, because the diseases of sheep have until lately formed no part of the education of the veterinary pupil, and even at the present hour are scarcely heard of at the National Veterinary School. This is a lamentable and disgraceful state of things; and the agriculturist deserves all the inconvenience and loss which he experiences, if he permits it longer to continue.

The contrivances to remove or destroy the cyst that have hitherto been resorted to, proceed chiefly from the ingenuity or the brutality of the sheep-master or the shepherd. Mr. Parkinson says that his father's remedy was to cut off the ears of the sturdied sheep, and that rather by way of bleeding than with any other intention; and that a sheep now and then, perhaps one in twenty, was thus cured. "It happened one day," he proceeds, "that when I was with my father's shepherd, I observed one of the half-year-olds, although not entirely leaving the flock, yet having the appearance of being affected with the disease. The shepherd was an extraordinary good runner; but this sheep gave him a severe chase, and he was some time in catching it, which put him in a passion, and happening to take it by the ears, he twirled it round several times before I got to him; I then cut off its ears as near to the head as I could with safety, it being our usual practice to cut them off pretty close; but by swinging it round the shepherd had probably pulled the ears out of the socket. The result was, that in about two days the sheep had rejoined the flock. Since that recurrence, I have made it a rule constantly to pull the ears very hard for some time before I cut them off, and this proceeding has seldom failed of effecting a cure *."

It is easy to imagine that in the dreadful struggle which must ensue in wringing the ears so "very hard," and then cutting them off, the hydatid would probably be ruptured and destroyed.

Others effect the same object in as brutal a way. They set the dog on the poor sheep, to hunt and worry it without mercy; and the chase is so contrived, that, if possible, the animal shall tumble down some stone-pit, or considerable declivity. In the shock of the fall the hydatid is burst, and, now and then, the neck of the sheep is broken too.

Several cases are gravely related in confirmation of this practice. A sturdied sheep was frightened by a pack of hounds, that came into the field in which it was grazing. It leaped over a high hedge, fell violently on the other side, and from that moment was well. Another was standing on the edge of a precipice—he, too, was frightened, and fell to the bottom, and was ever afterwards free from the disease. All these modes of proceeding are far too brutal and barbarous.

The Ettrick Shepherd adopted a very ingenious operation. He shall speak for himself:—"When I was a youth, I was engaged for many years in herding a large parcel of lambs, whose bleating brought all the sturdies in the neighbourhood to them, and with whom I was everlastingly plagued; but as I was frequently knitting stockings, I fell upon the following plan: I caught every sturdied sheep that I could lay my hands upon, and probed him up the nostrils to the very brain with one of my wires. I beheld, with no small

* Parkinson on Sheep, vol. i., p. 412.

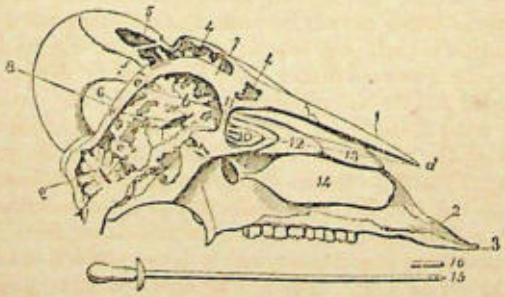
degree of pleasure, that by this simple operation I cured many a sheep to different owners; but I kept all my projects to myself, for I had no authority to try my skill on any of them *."

In another place he describes this operation more particularly. "The operator must feel for the part of the skull that is soft—[this softening of the skull will presently be explained]—and lay his thumb flat and firm upon it; then taking the wire in his right hand, he must push it up the nostril that points most directly towards the place that is soft, where the disease is seated; and if he feel the point of the wire below his thumb, he may rest assured that the bag is perforated, and that, if the brain does not inflame, the sheep will be better. The bladder being thus pierced on the lower side, the liquid continues to drip through the hole as long as any remains, and even as fast as it gathers; so that the perforation has no opportunity to grow up or close again until the animal is quite better †."

If the reader will recollect what has been said of the manner of running or walking of the sturdied sheep, he will perceive that the wire may be resorted to before the softness begins to appear, or when, from the situation of the hydatid, there cannot be any softness.

Mr. Hogg says that "several years passed before he failed in this operation in any one instance ‡." It has not, however, been so successful or so easy to perform in other hands.

The writer of this essay has performed the operation many a time on the dead subject, and more than once on the living one. It was not always that he could hit at once the plate of the ethmoid bone, and enter the skull: for it does not present itself precisely as in the horse or the ox. He did not find it so easy a matter as it seems to have been to Mr. Hogg; and when he had perforated it, he might reach an hydatid on the superior part of the brain, but not deep in its surface, and assuredly not in the cerebellum.



This cut will render the operation of wiring more intelligible, and explain its advantages and defects. It is the representation of the bones of the head of a horned sheep, the brain remaining in the cranial cavity.

1. The nasal bone, being the roof of the cavity of the nose.
2. The upper-jaw bone, forming its side and a portion of its floor.
3. The intermaxillary bone at the fore-part of the mouth, and being the support of the pad or cushion substituted for the incisor teeth of the upper-jaw.
4. The frontal sinusus.
5. A portion of the bony support of the horn sawn off, in order to show that the sinuses of the horn are a continuation of the frontal ones, and thus illustrating the probable situation of the larva of the œstrus.

* Hogg on Sheep, p. 59. † Ibid, p. 58. ‡ Ibid, p. 60.

6. The parietal bone taking a slanting direction backwards and downwards, and protecting the brain from ordinary danger.
7. The arched form and great thickness of the frontal bone, where the chief danger of injury or fracture exists.
8. A vertical section of the brain.
9. A vertical section of the cerebellum.
a. The cineritious portion of the brain.
b. The medullary portion.
c. The supposed situation of an hydatid deep in the brain, or a portion of the roof of the lateral ventricle.
d d. The supposed direction of the wire or trocar in its passage up the nostril and through the brain.
10. The ethmoid bone, with its cells.
11. The cribriform or perforated plate of the ethmoid bone. It separates the nasal cavity from the brain; it is thin almost as a wafer, and pierced by numerous holes, through which the olfactory nerve penetrates, in order to spread itself over the inner part of the nose.
12. The development of the lower cell of the ethmoid bone.
13. The superior turbinated bone.
14. The inferior ditto.
15. The trocar and canula used instead of the wire.
16. The termination of the blunt probe which is first introduced.
17. The sphenoid bone.

The trocar (fig. 15)—a more surgical and more convenient instrument—was soon substituted for the wire and the knitting-needle. It must be of sufficient length to reach from the muzzle to the back part of the head. It will immediately be seen that the superior turbinated bone (fig. 13) and the whole of the ethmoid bone (figs. 10, 11, 12) will be perforated by it. In order to remedy this, a blunt probe, the termination of which is shown at fig. 16, fitting the canula, and having a handle like the trocar, was introduced, which was supposed to push aside these bones, and not to wound them; and when it had reached the cribriform plate (fig. 11) it was withdrawn from the canula, and the trocar introduced. It will, however, be evident, that these bones cannot be pushed aside—they must be perforated before the cribriform plate can be reached, and that will be done with less pain and injury by a pointed than a blunt instrument: the probe, therefore, must be discarded and the sharp-pointed trocar used. There are no large vessels ramifying upon these bones, and a slight bleeding cannot be dangerous.

Suppose, then, the trocar to be introduced, as near as possible to the nasal bone (fig. 1), and to follow the direction of that bone; it probably would not touch the cribriform or perforated plate of the ethmoid bone, but be impeded by a dense projection of the frontal bone from above. If it takes a lower direction, it will meet with a dense projection of the ethmoid bone itself—the *crista galli*. The middle course is of no great extent, and not so easy to pursue as Mr. Hogg's account would induce the reader to believe.

If, however, the trocar has perforated the cribriform plate (fig. 11), there is but a small portion of the brain that can be reached, for the slanting direction of the frontal and parietal bones, and the corresponding depression of the brain, protects the greater part of it from this internal injury as well as from external violence. If the hydatid should lie superficially, it may not be touched: if it lies deep in the brain, or towards the back part of it, it is quite out of the reach of the trocar. By piercing the lower part of the lateral ventricle (*c*) the cyst may be broken, or water evacuated; but the path to this is narrow and uncertain. There is very considerable doubt of much success attending this operation.

On the other hand, there is much danger in this perforation of the medullary substance. It is true, that after the membranes and bones of the

nose have been pierced, the sheep feels not the entrance of the wire into the brain; but that organ is too lavishly supplied with blood-vessels not to render the almost immediate accession of inflammation a matter of apprehension. Mr. Hogg candidly owns that the sheep which die in consequence of wiring are "in the greatest agonies, and often groan most piteously." He also acknowledges that in a few instances he has seen the sheep drop like a creature *felled*, and expire in the course of two minutes*; and it is well known that, on dissection, the brain is found inflamed, and the course of the wire is as evident as any thing can be, presenting an appearance as if a probe as large as a quill had passed through the brain.

In addition to all this, there are sometimes two or three of these hydatids in the same brain, and occupying very different situations in it, so that the wire cannot possibly reach them all. It probably therefore will be the fate of this once celebrated operation, and which the name of the Ettrick Shepherd for a while rendered popular, to fall into comparative disuse and distrust. It will be least objectionable, or perhaps may be justified, and even recommended, when the symptoms of sturdy first appear, and are of such a nature as tolerably clearly to indicate the situation of the hydatid, and that within the reach of the trocar.

Allusion has been made to the softening of the skull at some particular spot. The effect of pressure has not always been sufficiently understood in veterinary or human practice. The slight but constant pressure of this bladder is not only sufficient to cause a portion of the brain to be absorbed, in order to make room for the growth of the hydatid, but even the bony substance of the roof of the cranium disappears; and therefore in process of time a soft yielding spot, somewhat variable in its situation, but generally a little anterior to the root of the horn, or where the horn would have been, or in a slight degree more towards the centre of the skull, marks the residence of this parasite. Another kind of operation can now be attempted in order to get rid of this formidable being.

A square is drawn in the mind of the operator upon this softened part, one side of it being equal to the diameter of the trephine which he is about to use. Two incisions are made diagonally, from corner to corner of this square; and the four flaps thus formed are dissected from the parts below, and turned back. If any portion of bone remains, it is then removed by the trephine; or if the bone is quite gone, two other incisions are cautiously made with the knife, in the same direction as before, through the pericranium and the membranes of the brain; and when these flaps also are turned back the hydatid will generally be visible underneath. It will be a matter of some importance and interest to extract the hydatid whole; but this will not often be practicable. Every portion of it, however, and of the fluid which it contained, must be carefully removed; and then the membranes and the integument must be restored to their situation, and a soft pledget, or, what is better, an adhesive plaister, must be put over the whole.

Some operators, afraid of the large opening into the cranium caused by the trephine, have contented themselves with puncturing the cyst at the spot at which the skull is softened. At first a trocar was used for this purpose, and a small syringe was adapted to it, in order to pump out all the fluid

* Sir George Steuart Mackenzie, in his valuable Treatise on Sheep, is inclined to recommend this operation; and he says truly, with regard to this occasional consequence of it, "Although the animal should at the time appear sick, and even dead, it should not be abandoned; for there have been instances of a sheep recovering after having lain as if dead some hours. Bleeding after the operation may be of much service; and care should be taken not to disturb the animal in any way while recovering.

that the hydatid might contain; and sometimes the hydatid itself was brought out in this way: but there was occasionally some trouble attending the adaptation of this compound instrument, and the syringe was abandoned, and a small trocar or even a common awl was substituted.

The sheep is laid on his back during the operation, in order that as much as possible of the contained fluid may escape. The English veterinarians have mostly preferred the trephine; the French have recourse to the puncture. M. Yvart, Director of the Veterinary School at Alfort, recommends that the hydatid should be punctured three or four times, and with intervals of two days between each puncture. He has thought that more patients were saved by this method.

There are serious objections to the use of the trephine, arising from the enormous vacuum in the cranium, suddenly formed by the removal of the hydatid, and the cerebral disturbance which must be the necessary result of it: also the rush of blood which would follow when the vessels, relieved from the compression to which they had been long subjected, rapidly dilated, the admission of the atmospheric air into such a cavity, and the irritation which it must inevitably occasion. These are formidable difficulties, and sufficiently account for the great number of unsuccessful cases. He may consider himself fortunate who saves—permanently saves—two sheep out of five who have been submitted to this operation*.

In favour of the operation by puncture, it may be pleaded that the fluid is more slowly evacuated; at first in a small stream, and, afterwards, drop by drop: that the surrounding parts have a somewhat better chance of adapting themselves to the change, while there is not so free an opening for the admission of the external air, nor so much probability of fatal inflammation from this cause. On the other hand, there is no certainty of the hydatid being destroyed, unless the repeated operation of Professor Yvart is resorted to; and there is not so fair an opportunity of detecting other hydatids that may be situated near to the principal one. On the whole, however, the operation by puncture, if delayed until there is some indication of the situation of the hydatid, is to be preferred; for although it has not so surgical an appearance, more sheep are saved by it.

The efficacy of both operations is considerably diminished by their being delayed too long. When the skull begins to soften, sad ravages must have been committed in the cranial cavity. Before the solid roof will yield, a very considerable portion of the brain will have disappeared; and the chances of saving the animal will have very materially diminished. It is not necessary to wait so long in order to ascertain the *existence* of the cyst, for the separation of the sheep from his fellows, his peculiar gait and manner, and the evident impairment of intellect, will plainly mark him out as a sturdy. Then, if he is carefully observed, it will soon be tolerably apparent on which side the parasite is lodged; and experience will tell the farmer or the practitioner, that in the majority of cases, on whichever side it exists, it is about an inch anterior to the root of the horn, or the place where the horn would be, and in a direction towards the frontal suture. In this comparatively early stage of the disease the trephine or the trocar may be resorted

* Sir Astley Cooper, who, from his long connexion with the Veterinary College, and an intimate friendship of more than half a century with the Professor, was much attached to the veterinary art, and conducted many an interesting experiment at his farm, near Hemel Hempstead, used to take much pride in exhibiting a ewe which he had trephined on account of turnsick; and from whose cranium he had extracted a large hydatid. She afterwards brought him five or six good lambs.

to with little danger; no considerable cavity will probably exist, nor will the brain be so disposed to take on inflammation.

There is still another question to be taken into consideration. Supposing that the hydatid has been destroyed, and a seeming cure has been effected by either operation, is there any certainty that the evil is permanently removed? No. The most successful cases must be regarded with much suspicion. No sooner has one hydatid been removed than another will, too often, begin to develop itself. Huzard has counted no less than thirty distinct cysts in the brain of a lamb: therefore the operation may have to be repeated almost without end, and, after all, the animal will perish. Six or nine months may pass, and the animal may not be safe. As for medicine, it is altogether out of the question: no drug has power to reach the hydatids and destroy them in their place of concealment. Considering, however, the cause of the disease, and the almost invariably impoverished state of the animal, he should be removed, immediately after the operation, to a more wholesome pasture, and particularly a dry and upland one.

What then is the duty of the farmer? Why, to fatten the lamb that has been operated upon, and to sell him as speedily as he can; for it appears that, in too great a portion of cases, three months will scarcely pass, ere the disease will return. What shall he do with the sturdied sheep that has not been operated upon? Send him immediately to the butcher, in whatever condition he may be. The chances are that he will eventually die, and die worthless—a mere skeleton; at present he will probably fetch some price, and the wholesomeness of the flesh has not been in the slightest degree impaired by this disease in its earlier stages. What shall he do with regard to his flock generally? Take more care of them—fatten them as quickly as he can, and slaughter those that become affected the very moment the disease is ascertained. Is there anything more that he can do? Yes! He should take better care of the ewes and the lambs in the early part of the spring. There is no necessity for him to adopt a system of nursing which would render his flock unable to endure the sudden changes of the English climate; but there is a recklessness about many sheepmasters with regard to the mother and the offspring, at yeaning time, which cannot be too strongly reprobated, and for which they severely and justly suffer. More attention might likewise be paid to the pasturage on which the sheep are turned. It should be more suitable to their early age, somewhat better sheltered, and, where it is required, more carefully drained. The disease is the consequence of debility—and that debility is caused by the inexcusable neglect of the owner of the sheep. It is the offspring of cold and wet and hunger, and nature herself points out the cure; for when the winter and the early months of spring have passed, the disease almost disappears.

M. Giron de Buzaseinques, in an essay on Turnsick, read before the Royal and Central Societies of Agriculture, in 1824, thus expresses himself:—"I have put into practice my mode of prevention. I have fed my flock better, and given them more exercise. I have driven them on the mountains of Aveyron, where the salubrity of the air and the diversity of the herbage invite them to stray about, and to cull the sweetest food. I have placed salt within their reach; and by such regimen I have strengthened my sheep; and the consequence has been, that I have had less turnsick among them. The malady is on its gradual decline, and I reckon, by perseverance, to get completely rid of it*."

* A sketch of the opinions of different agricultural writers, respecting a disease so prevalent and so fatal, may not be uninteresting to the reader. Ellis,

The turnsick is occasionally complicated with a peculiar species of palsy, not confined to one side or to one limb, but shifting from part to part, and

Ellis, whose work contains a singular compound of good sense and quackery, recommends the trephine. The softened part of the skull is to be cut three-parts round, and then lifted up; but not separated or broken. The bladder is then to be taken out, the lid or raised part of the skull to be put carefully down, and secured by a little linen rag and a plaster of pitch. An infusion of bruised wild thyme, in ale, must after this be given to the sheep, and the juice of ivy leaves poured into the ear, and kept there by binding the ear carefully down!! By adopting these means, he says, one sheep in two or three may chance to live and do well.

J. Lawrence recommends the trephine as the radical operation, and says that one sheep out of five is usually saved by this; but that rowels and setons under the chin may be used, and the head may be blistered, and mercurials administered!!

Dickson, in his valuable work on agriculture, says that it is an encysted collection of water in the head, and that there is an old fellow who opens the skull, and takes out the bladder, and cures as many as he loses. In his later work on live-stock, he traces the disease to exposure to tempestuous and severe weather, without due shelter. He speaks of all these operations, the wire, and the trephine, and the puncture; but in addition to these he gives certain formulæ for the administering of calomel, and squills, and cream of tartar, and rhubarb, and grains of paradise, and bark, and various other drugs, useless, or worse than useless, in such a case.

Hogg attributes the disease to too much exposure to rough and boisterous weather, without due shelter. He says that a clothed sheep will never take it, and of a well-sheltered flock, few will. His remedy is the wire.

White, after mistaking the almost invariable progress of the disease, and stating that the sheep are often in good order when they die, recommends the farmer to kill the animal early in the disorder, as the disease is merely local, and does not in the least injure the mutton.

Clater, in his last edition, acknowledges the presence of the hydatid, as the cause or essence of the disease; and, despairing of general success, either from medical treatment or mechanical contrivance, advises that the sturdied sheep should immediately be slaughtered.

Mackenzie recommends the wire in the hands of the shepherd, and the trephine in those of the surgeon.

Professor Low recommends the trephine, or in default of it, the pen-knife or the awl, when the skull is softened; and he places much confidence in the use of the wire, when the existence of the disease is first ascertained.

The author of the Complete Grazier recommends the trephine, but properly adds, that "even that can prove successful in the hands of skilful persons alone."

Among the French writers, Vatel traces the appearance of the hydatid to any circumstance, but particularly connected with the food, which produces or disposes to general debility. He recommends that the trephine should be abandoned altogether, and the operation by puncture adopted; although he acknowledges that, in general, few animals are saved by this method of proceeding. All the French veterinarians adopt the same opinion and practice.

The proceedings of two empirics were both singular and ludicrous. M. Nairac advocated the actual cautery. A branding iron was made, to which, in the true spirit of charlatanism, an N was affixed. The wool was cut off from the forehead, and the iron being heated so that, resting on a card for two seconds, it would carbonize but not perforate it, it was placed somewhat lightly on the forehead of the lamb. After resting there two seconds, it was lifted up and immediately replaced with greater pressure, for three seconds; it was once more removed, and again pressed yet more firmly on the skull for five seconds. The operator was cautioned to be exceedingly careful as to the gradually increasing pressure, and the continuance and the removal of the iron from the forehead at the specified interval. All the lambs of four or five months old were to undergo this severe cauterization, over the frontal sinuses, and between the eyes. This was the preventive treatment, and according to him and his disciples it was infallible. He operated upon many thousands of lambs, belonging to himself and others, and did not lose one. He continued his experiments during fifteen years without a single failure.

This was more satisfactory than the knitting needle of the Ettrick Shepherd; and this cabalistic cautery began to be very generally adopted.

Some persons, however, were disposed to doubt whether this magical branding on the forehead, severe as it was, could destroy the diminutive hydatid, which might then have existence, but was incapable of doing mischief; and still more they doubted whether the permanent effect which Nairac described could possibly be produced; and they de-

from side to side, and being accompanied by a more than usual degree of impairment of intellect, and sometimes by partial or total blindness. This

termined to put its boasted preventive power to the test. Hurtrel D'Arboval, the author of that excellent work, "Dictionnaire de Médécine et de Chirurgie Vétérinaire," entered the field among the rest; and he experimented on a somewhat large scale. He had a flock of 174 Merino lambs, and none of them a twelvemonth old. He applied the cautery, with all the enjoined ceremonies, to ninety-three of them; and he left the remaining eighty-one to take their chance. Out of the ninety-three no fewer than eight became sturdied and died; while only four of the 81 were affected.

Hurtrel D'Arboval, with his usual candour, acknowledges that he should not be justified in concluding from this single experiment that the cauterization predisposed the animal to the production and growth of the hydatid; but that he was fully warranted in asserting that the cauterization had no preventive effect. With many other experimentalists the result was precisely the same. And what became of the discovery of M. Nairac? It added another to the long list of delusions to which the human mind has occasionally abandoned itself.—See Dict. *mot* Tournis.

M. Nairac was no sooner out of the field than it was occupied by another and a bolder empiric. He professed to combat the disease when it was developed in its most frightful form. The branding-iron was again had recourse to, with the same attention to the number and the duration of its applications; but the iron was hotter, and considerable sloughing and discharge ensued. The iron was to be placed over the situation occupied by the hydatid.

This was soon put to the test, and the result was as satisfactory as could be desired. Four sturdied sheep were procured—they were cauterized in due form, and they seemed to be perfectly cured. This operation might therefore be justly placed on the same level with the puncture and the trephine. But who will answer that the cranial cavity enclosed one hydatid alone. Unfortunately for the pretender, each of these sheep protected within its skull at least a second hydatid; and, at the expiration of four months, the disease returned and they died. This mode of treatment, therefore, lost much of its reputation, and is less practised in France than the mode by puncture.

M. Lullin, in his account of the sheep and its diseases in Switzerland, while he acknowledges that the turnsick oftenest proceeds from the presence of an hydatid in or upon the brain, yet, asserts that it is occasionally caused by violent blows on the head. He singularly, and somewhat ridiculously, accounts for the head being turned on one side rather than the other, according as the lamb has been accustomed to turn his head in the act of sucking. He has considerable faith in trepanning, skilfully performed; but the instances of failure are so numerous that he counsels the farmer to send the sturdied sheep immediately to the butcher.—*Observations sur les Bêtes à laine dans les environs de Genève. Par* C. J. M. Lullin.—p. 182.

In Saxony there are many breeders who keep their lambs in the house until autumn, and even throughout the first year; but care is taken to supply them with good and sufficient food. "The lambs are kept in the houses because it has been remarked that those that do not go into the pastures during the first year of their lives, are very rarely attacked by the dunt or giddiness.—*Lasteyrie* on Merino sheep, translated by B. Thompson.—p. 160.

In Prussia, according to the same author, "the sheep masters believe that the unknown parent of the hydatid pierces the skull in some part of the forehead, and there deposits its eggs; accordingly they endeavour to secure their flocks from the dunt or giddiness, by fastening a cloth, covered with pitch, upon the heads of the lambs before they are conducted to the fields."—*Lasteyrie*, p. 179.

Other farmers of the same country cover the whole of the skull with a glutinous impervious substance, composed principally of the white of eggs. Not a sheep the less, however, is attacked. In fact, these authors are confounding the larva that inhabits the frontal sinuses with the hydatid that is found in the cranial cavities. Some proprietors of sheep leave the head covered with wool until the lambs are eighteen months old. Others bleed largely when the sturdy begins to appear, and extend this abstraction of blood to the whole of the flock; while many sheepmasters severely blister the whole of the roof of the skull.

There is scarcely another disease of sheep with regard to which such various and opposite opinions are held, and the attempt to combat which is so often fruitless; while, if rightly considered, there is no complaint the treatment of which is so plain and simple; namely, either to prevent the formation of the hydatid by breeding from healthy and hardy subjects, and taking proper care of the sheep during the time that they are chiefly exposed to the attack of the parasite; or by mechanically removing the hydatid; or slaughtering the sheep before he begins to pine away and become worthless.

is a frequent consequence of mechanical pressure on the deeper seated parts of the brain, and seldom admits of relief.

The turnsick is not so frequent as it used to be thirty or forty years ago; and, as agriculture improves, and a better system of breeding and feeding prevails, and a little more humanity governs the proceedings of the farmer, yet fewer cases of it will occur, and it will at length be struck from the list of diseases to which the animal is exposed.

WATER IN THE HEAD.

There is occasionally, and even more frequently in the lamb than in the calf, an effusion of serous fluid within the cranial cavity. It is not confined within a cyst—it is not a portion or part of a living animal, as in the disease just treated of—but it accumulates between the two investing membranes of the brain,—the *pia mater* and the *arachnoid coat;* or it is found within the latter; or, and more frequently, it occupies and distends the ventricles of the brain.

It is sometimes *congenital:* it attacks the lamb while in its fœtal state. The bones being then comparatively soft, and the sutures not closed, the head is distorted and enlarged, and delivery is rendered difficult, if not impossible, with safety to both the mother and the lamb. In such case, before the mother is too much exhausted or injured by rude attempts to deliver her, it will be advisable to perforate the head of the fœtus, and evacuate the fluid,—an operation which is inevitably fatal to the young one, but insures the life of the ewe.

The cause of this congenital *hydrocephalus*, or *water in the head*, is unknown; the existence of it can at no time be detected previous to parturition, much less can the period of its commencement be ascertained. It may, however, without much danger of error, be traced to weakness of constitution in one or both of the parents, or to neglect and starvation during the period of utero-gestation. If one or two cases of this disease in the lamb occur, the farmer will do well seriously to review his whole system of management; at all events, he should never again breed from the same ewe, for there are few diseases in which hereditary predisposition is so evident as in this. If two or three cases occur in the flock, and the general management is good, and the ewes apparently healthy, the ram may be suspected, and should be dismissed.

Young lambs oftener die of water in the head than the shepherd or the sheepmaster suspects. How often, a very short time after birth,—the appetite sometimes failing, but more frequently becoming almost voracious,—the bowels sometimes relaxed, but oftener constipated,—does the lamb become dull and disinclined to move,—staggering a little as he walks,—presenting a greater or less degree of stupidity, either in the expression of the countenance or his mode of action, or both,—pining away almost to a skeleton,—and dying, occasionally before the expiration of the first month, and rarely surviving the second. The disease is described by no writer, but it is familiar enough to the sheep-owner. These are generally cases of water in the head: the skull is a little enlarged—the bones of it thin, or sometimes strangely thickened—the ventricles filled with water—the walls of them diminished in thickness, or having become almost membranous. Under the pressure of this unnatural quantity of fluid, the powers of the mind and of the body have gradually sunk. Such a disease must generally be incurable; but in a few cases a successful struggle might be made against it. The principal dependance would be placed on purgatives and tonics combined—the Epsom salts with ginger and gentian, and small

doses of mercurial medicine—the blue pill—in doses of four or five grains, being sufficiently manageable, and, at the same time, the safest and most efficacious preparation. Plenty of good milk should be allowed from a foster-mother, as well as from the real one, with exercise and air, and good food, according to the convenience of the owner. If no other advantage were gained from a knowledge of the true nature of this disease, the farmer would at least be taught that there was something wrong in the breed or the management, or the situation, and the proper remedy might possibly suggest itself.

ABSCESS IN THE BRAIN.

This disease is mentioned, because one case, and one only, has come under the notice of the author. In sawing through many heads, in order to obtain the larvæ of the œstrus ovis in different stages of maturity, he found an abscess in the centre of the right hemisphere, containing more than an ounce of dirty-white purulent matter, resembling the pus found in other parts, but of almost intolerable fœtor. The substance around was softened, and of nearly the same colour. It seemed as if the abscess was in a state of active enlargement. He immediately carried the head to the man at whose shop it was bought, with the hope that he might be able to trace it to the butcher; but so many passing through the hands of this person, he did not recognize it. It may be safely taken for granted that the sheep was in the ordinary condition of those that are slaughtered for the market; and the case is an illustration of the extent to which these processes may be carried without interfering with general health.

APOPLEXY.

This is a very frequent and fatal species of pressure on the brain. It is even more prevalent in the sheep than the ox. The forcing system of feeding is carried to a greater extent, if possible, in the sheep than in cattle; and there is this peculiar danger—that, while the comparatively thin hair of the ox allows of a considerable degree of cutaneous perspiration, the woolly coat of the sheep, and the greasy yolky matter with which he is surrounded, materially diminish, or almost entirely prevent, the superabundant fluid from escaping. The sheep is therefore naturally a more plethoric animal than the ox, and more liable to all the diseases connected with redundance of blood, and to apoplexy among the rest.

Let it be supposed that a flock of sheep, apparently in perfect health, are grazing on a pasture somewhat too luxuriant. They have been lately put upon it; they have perhaps been driven a little distance to it, and the weather is hot;—or let it be supposed that the pasture is good and the sheep in high condition. Suddenly one of them stands still—he seems to be fixed to the spot; or, if he attempt to move, his hind legs fail him—the pupils are dilated and motionless—the eyes are fixed and almost blind—and he stumbles over everything in his way. Tessier says that he will march into the middle of a pack of hounds, and that their barking does not affright him; in fact, he is unconscious of everything around him. The conjunctival and nasal membranes are of a deep red or violet hue, the nostrils are dilated, the pulse hard and full, and the breathing generally stertorous. Presently he begins to stagger—he falls—he struggles—he dies: and all this takes place in less than a quarter of an hour. If he had been carefully looked after this might have been foreseen, and probably prevented. It would have been observed that the sheep was dull—that he lagged behind as he travelled to the pasture—that his flanks heaved a little, and, possibly, that

rumination had ceased: precautionary measures might then have been taken.

The author is in the habit of attending the annual meeting of the Smithfield Club, and certainly, as he goes from pen to pen, he admires the beautiful symmetry and the high condition of the rival Southdown and Leicester sheep, which are there exhibited; yet the pleasure is somewhat alloyed by the recollection that they are in an unnatural and dangerous state, and that there may be scarcely a step between them and death. He is struck with the appearance of a particular sheep. "Ah, Sir!" says the owner, "I thought to have had a pen of them, but two of them died of inflammation just before I was about to start." "I lost one on the journey," says another. "And I lost one," says a third, "for which I would not have taken fifty guineas."

"They all died of inflammation." No such thing. It was apoplexy—the blood-striking, the *apoplexia fulminans* of the old writers, the *apoplexie foudroyante* of the French. They had been brought to the highest and most dangerous state of condition. Every vessel was filled with blood. They were disturbed by the preparation for their journey, or by the fatigue of it. The heart beat quicker and more powerfully: an additional quantity of blood rushed through the frame. It was impelled to the brain as well as to other parts. But the brain is enclosed in an unyielding case; and when the arteries and the capillary vessels are distended with blood, they press upon the veins, and the coats of the veins being of a far more yielding nature than that of the arteries, large and small, they yield, and the passage through them is materially diminished, or obliterated. The heart still labours to force the vital current on—the arteries become more and more distended—the veins become impervious—the pressure is dreadful, but the bony covering of the brain yields not. The base of the brain, whence arise the nerves of sensation and motion, is compressed, benumbed, and its functions are suspended—the animal has lost all feeling, and all power of voluntary motion. The portion of the ganglial system, which supplies the brain, becomes powerless under the same deadly weight, and life is suspended or lost. There is no *inflammation!* Inflammation is a very convenient term to conceal many a blunder and many a false theory. It is sudden and fatal oppression of every vital organ; not produced by a more violent determination of blood to the head than to other parts, as the language of some writers would suggest, but by the inability of the vessels of the brain, by reason of the unyielding bone that surrounds them, to circulate that increased quantity of blood which the vessels of other parts can readily dispose of by means of the expansibility of their coats, and their consequent enlarged calibre. It is in a state of general plethora, *which may become the parent of inflammation*; but is not the necessary cause of it. It is a highly dangerous state, of which sheep-breeders dream not when they view with delight the high condition of their flocks, and hasten the production of that high condition by every means in their power.

When a flock of sheep is approaching to that *condition*, which some breeders are so anxious to produce, it should be very carefully watched; and if one of them is found lagging behind—standing still, if he can—his head hanging down—half stupid, half blind, and half deaf, he should immediately be bled, and to the extent which the case may indicate, or the animal will bear. A pound is perhaps about the average quantity that should be drawn at the first bleeding; and that not taken from the eye-vein—the vessel usually opened by the shepherd, and the farrier too—for

the most adroit of them cannot always obtain any great quantity of blood from this vein, and seldomer can they obtain it so rapidly as it should be drawn—but from the jugular, a vessel quite as easily opened, and from which the blood will flow in a much fuller stream. No harm could ever ensue from this bleeding, and many a valuable animal would be saved.

Four ounces of Epsom salts should be administered as soon as possible after the bleeding, and an additional ounce every six hours, until the bowels are opened. The sheep should be removed to poorer pasture, or taken into the farm-yard, and very sparingly fed during a few days afterwards.

It should be deeply impressed on the mind of the sheep-master, that although, from strength of constitution, sheep may struggle against an attack of apoplexy, and the most alarming symptoms may gradually disappear, yet, except the depletive measures just recommended have been adopted, the recovery will be delusive. The disease will pass into a chronic state; and at length will terminate in the death of the patient, attended by all the symptoms of inflammation of the brain.

That farmer would act judiciously, who, having lost one or two sheep by apoplexy, were, in addition to a change of pasture, to abstract about half a pound of blood from, and give 4 oz. of Epsom salts to, every one that is in tolerable condition. He might avert impending mischief—he would improve, rather than diminish, the condition of his flock, and he would render that condition safe. This is particularly expedient at the beginning of the summer.

INFLAMMATION OF THE BRAIN.

Inflammation—sometimes of the substance of the brain, and, at other times, of its membranes, and occasionally involving both of them, is not of unfrequent occurrence. Inflammation of the substance of the brain often follows an attack of apoplexy. In an early stage of the disease the eyes are red and protruded—the animal is at first dull and heavy, and disinclined to move; but the scene soon changes—the eyes brighten—the flanks begin to heave—the sheep is in constant motion—he cocks his tail, and gallops about the field, and attacks his companions or the shepherd, or even a post or a tree that may chance to attract his attention. This ferocity—the effect of temporary delirium—has been confounded with madness: the manifest difference of character and symptoms will be best described when the latter disease is treated of.

The causes are nearly the same as those of apoplexy—too stimulating food and too great redundancy of blood, over-driving, and, occasionally, atmospheric influence. As for the treatment, the case too frequently will not admit of any. If the animal can be approached and managed during a remission of the more violent symptoms, he should be bled unto fainting. Physic will be more easily given. The sheep, like the ox, seems to have an insatiable thirst when he is labouring under this disease; and therefore he may be cheated with a solution of Epsom salts, and possibly half a drachm of the farina of the croton nut. Use should also be made of some temporary remission of the symptoms in order to confine the animal, and take from him the power of doing mischief. Should the frenzy appear to be subdued, dependance cannot always be placed upon him, for, if subjected to the least restraint or annoyance, the fit will sometimes return; and, at all events, although the inflammation may appear to be subdued, so much mischief may have been previously done, that the animal will pine away and die a mere skeleton. A continued course of purging and fever

medicine must be entered upon and pursued, and the animal disposed of as soon as possible*.

Frenzy, or brain fever, occurs more frequently among lambs than adult sheep. Mr. Tait, of Portsoy, gives an interesting account of this malady in lambs—an abridgment of which is here subjoined.

"Some time ago I was requested to look at a flock of sheep. Upon inquiry I found that the sheep, owing to the dry season (1826), had been considerably stinted in their food in the summer time, and that they had been, about a month before I saw them, turned into a field of very fine turnips. The appearance of the sheep was rather strange. For about a minute they would stand motionless, and then, all at once, become quite frantic, dashing themselves on the ground, and running at every one within their reach. Others would all at once spring from the ground and fall down and die.

"I caught one and bled her copiously, which seemed to relieve her much. I then gave her a dose of Epsom salts, which, in a few days, produced a cure; and by such simple treatment many of the sheep recovered. In those that died, the lungs were very much congested, and the vessels of the brain turgid; and, in some cases, rupture had actually taken place, for there was an effusion of blood on the surface of the brain.

"The flock was immediately removed from the turnip-field, and turnips were given to them more sparingly, and the disease soon disappeared †."

DISEASES OF THE SPINAL CORD.

The diseases of the spinal cord will naturally come next under consideration. The spinal cord or marrow of the sheep, like that of the horse and ox, is divided by a central line, on the upper and under surface, through its whole extent. Each side is, at the commencement of the cord, plainly divisible into two columns, and each column has been supposed, or rather has been proved, to have a distinct and separate function. The inferior surfaces of the central columns are connected with voluntary motion: all the nerves of voluntary motion, extending over every part of the frame, proceed from these columns. The central ones, on the upper surface, are connected with sensation; and all the nerves—scattered over the body—which convey general sensation or feeling, terminate in these columns. The lateral ones, on either side, are connected with the movements and peculiar sensibility belonging to the existence and the functions of life.

There are certain classes of disease referrible to each of these columns, and they shall now pass in review. The central columns of the inferior surface first present themselves—the nerves of voluntary motion—and by means of which the mandates of the will are conveyed to the different parts of the frame. This is not the place, nor is this the kind of work, in which the nature of this nervous influence should be discussed; but in a popular, and perhaps not very unscientific way, the stream of nervous influence may

* The symptoms of Phrenitis are sometimes very curious in lambs. They leap and jump about, and exhibit the most ridiculous antics. Mr. John Lawrence says that "on the borders of Suffolk several scores of lambs were seized with an uncommon malady, leaping and jumping about the fold-yard, in a strange manner. A dung-hill happening to have been raised almost to a level with the eaves of a low-tiled barn, a number of the lambs ran skipping up to the top of the roof as if they were possessed by a thousand demons. The whole parish wisely concluded that they were bewitched, and a wretched and aged pauper became the object of their suspicion and deadly hatred. The senseless and horrible supposed-prevention of witchcraft was resorted to, namely, burning one of the poor animals alive."—*Lawrence on Cattle*, p. 632.

† Veterinarian, vol. viii. p. 611.

be supposed naturally to flow in a gentle equable stream, but it may be violently hurried on without pause, or quite suspended. These different states of nervous agency will explain the nature and character of certain nervous diseases. Those diseases in which the nervous influence may be supposed to be hurried violently along without relaxation or pause, first present themselves.

TETANUS.

This disease, more commonly known by the name of LOCKED JAW—because the forcible closing of the mouth is one of the earliest and most prominent, although not the invariable symptom—consists in a constant spasm of the voluntary muscles, and particularly those of the jaw, the neck, and the spine. The symptoms of tetanus in sheep differ materially from those of the horse and of cattle. It generally commences with a singular involuntary spasmodic motion of the head, or of one or all of the extremities, attended by a grinding of the teeth, and a fixedness of the jaws. To this succeeds a peculiar stiffness of the greater part of the frame; the neck is protruded and the head bent back, and forcibly retained in that bended form; and one leg is drawn up, and fixed in an unnatural position. This rigidness occasionally relaxes, and gives way to violent convulsions of the head, neck, and extremities, followed again by fixidity of them and of the whole frame. The disease runs its course most speedily: the animal is often dead within twelve hours from the first attack; or, if he lingers on beyond thirty-six hours, it may be regarded as a pledge of his ultimate recovery.

M. Gasparin relates an interesting case of it, which he had from his friend Professor Gohier, of Lyons. "About one o'clock in the afternoon I perceived one of my lambs standing in a very singular position: all his four quarters seemed to be stiffened—his head was elevated, and thrown considerably backward, and he was ready to fall if he changed his posture in the slightest degree. On examining him more attentively I found that his breathing was laborious, his pulse accelerated and hard, his mouth open in order to enable him to breathe more freely, the conjunctiva inflamed, and the extensor muscles of the head, the neck, and shoulder spasmodically contracted.

"At three o'clock the muscles of the jaw were nearly fixed, and the force of the spasm increased every minute, until the death of the animal. The poor creature frequently uttered a peculiarly plaintive sigh.

"At ten o'clock, if he was touched, however gently, the muscles of the extremities would be violently convulsed for one or two minutes, and he would fall. At two o'clock on the following morning the breathing was sadly laborious, and could be heard at a considerable distance; and this continued until six o'clock, when he died. The rapidity of this disease is very remarkable. As to the cause of it, the only thing that was known was, that he had been exposed during a considerable time to a violent rain; but two other lambs were also thus exposed, and escaped*."

The rain was the cause of the disease in this case. Thousands of ewes after lambing, and tens of thousands of lambs lately dropped, are lost every winter by careless and unfeeling agriculturists. It is not a great deal of attention that these animals require. A linney or shed, a few clumps of trees, or even a thick hedge to break the force of the wind, would render them in a manner comfortable; and certainly would remove very much of

* Gasparin, Manuel d'Art Vétérinaire, p. 432.

the danger; but when they are left altogether unprotected, nothing is more common than, after a cold night, to find some of the ewes and more of the lambs dying or dead. In travelling over some of the more open parts of the country on a winter's morning, the author has seen, in the space of twenty or thirty miles, more than as many sheep or lambs stiffened by the cold.

About weaning time tetanus is also very prevalent, and the old shepherds pretend to foretell what lambs will fall victims to it after castration. If, when the operator is sawing through the spermatic cord with his blunt knife, or gnawing it asunder with his teeth, the jaws of the little animal are strongly and spasmodically clenched, he says that that lamb is in danger of locked-jaw; and, in order to prevent its occurrence, he thrusts his thumb into the mouth of the sufferer, and forcibly separates the jaws. Hurtrel d'Arboval laughs at this; but there is some good sense in it. The spasm is interrupted—the charm is broken, and the disposition to this excess of muscular action is got rid of before it has had time to establish itself generally. Rams are far more subject than horses to tetanus after castration, and especially on the Continent, where the operation by torsion (*bistournage*) is often performed with unnecessary severity.

The indications of cure are the same in the sheep as in the horse and cattle. A bleeding from the jugular or from the eye-vein, and from the first rather than the second, should be immediately effected; and, before the jaw becomes thoroughly fixed, one or more doses of the castor-oil mixture (see MEDICINES) should be given; it combines the purgative and the anodyne, which such a case requires. Some persons administer aloes or Epsom salts, and, after that, repeated doses of the well-known compound the calves' cordial (see MEDICINES). The object sought to be accomplished is the same, but the opiate should at least speedily follow the purgative. The castor-oil mixture is far preferable.

Tetanus is a far more manageable disease in the sheep than in the horse or the ox. Thousands die because nothing is done; but the animal having been bled—the bowels having been opened—an opiate having been administered—the lamb having been put into a warm bath, and then tolerably dried and wrapped in blankets if the case is unusually bad, and at all times being placed within the influence of, but not too near, the fire—and a little gruel, mingled with ginger and ale, or even the housewife's gin, having been given—a cure will often be effected.

EPILEPSY.

This is an undue and excessive supply of nervous energy, extending over a considerable part of the frame, independent of the will, but with some pauses and suspensions, some alternate contractions and relaxations. Tetanus and epilepsy may be regarded as kindred diseases in all animals; but in none do they so assimilate to each other as in the sheep. Tetanus appears in him to be little more than an aggravated state of epilepsy. Sheep are much more subject to epilepsy than either horses or cattle are. This has been observed from a very early period of time. Hippocrates speaks of the frequency of its attacks*. On a sudden, and without any apparent cause, a sheep will cease to graze—he will stare stupidly in every direction, stagger, run round three or four times, and then fall, and struggle violently for several minutes. By degrees the convulsions subside—then

* Lib. de Morbo sacro. See also Recherches sur les Maladies Epizootiques, par M. Paulet, tom. i. p. 80.

cease—and the animal gets up with the same half-unconsciousness that has been described in the horse and the ox: this wears away, and he begins to graze again.

These attacks oftenest occur in young sheep in good condition, and after sudden and improvident change of pasture. They are frequent in the beginning of spring, and more so towards the latter part of autumn, when the hoar-frost lies thick upon the ground. The sheep, either not having been folded, or being dismissed from the fold too early, gather a considerable quantity of this congealed water with their food, and it palsies the action of the rumen, impedes the circulation of the blood through it, and determines the blood to other and more important parts, and, among them, the head.

The author of this treatise had occasion to travel over the Downs of Wiltshire in the beginning of November, about a dozen years ago: and he had an instructive, but not pleasing, illustration of this cause of epilepsy. Within two hours after daybreak he saw at least a dozen sheep and lambs with the convulsions of epilepsy strong upon them. The coachman told him that on every fine cold morning he saw nearly or quite as many. He had also an illustration of the favourite method of cure among some of the shepherds. It was to destroy one morbid derangement of the nervous system by setting up another. The dog was turned upon these poor animals, who were speedily frightened, not out of their senses, but into them again. He saw this succeed in various instances, but he thought that it was a dangerous and a brutal mode of cure. The chain of diseased action might sometimes be broken, but it was possible that the determination of blood to the brain, which was the cause of these convulsions, might be abundantly and fatally increased. He imagined that it would have been better to have soothed the poor animals—to have taken some of them home and nursed them—and, most of all, not to have exposed them to the influence of this cause of derangement of the vital and nervous powers.

In some parts of the continent this disease is very prevalent and fatal among sheep, and is traced to the nature of the pasturage. Tessier, in his valuable work on sheep, speaks of it as having been lately introduced, and now of frequent occurrence and exceedingly fatal in the district of Beauce in France. When it once attacks a flock, it finds so great a predisposition in them all to be affected by it, that the farmer either gets rid of the whole flock, or he destroys every sheep that exhibits the slightest symptom of disease. Many of the farmers of the district have actually given up sheep-husbandry, on account of the frequent and extensive ravages of this malady. He attributes the complaint to the cultivation of a kind of pasture in Beauce, different from that on which the sheep used to feed, but he does not enter into the particulars that could have been wished on such a point *.

Gasparin, speaking of its prevalence in Germany, says, that it is most destructive in the spring and summer, and occasionally so in winter; and he adds, that the shepherds there attribute it to the feeding on some species of dock and garlick in the winter, and on the sproutings of the pine in the spring. Pasturage and condition are probably the main agents in the production of this disease †.

PALSY.

This disease, which consists of a partial or total suspension of nervous influence on the muscles of voluntary motion, is not of so frequent occur-

* Instructions sur les Bêtes à Laine, par M. Tessier, p. 291.
† Manuel de l'Art Vétérinaire, par A. D. Gasparin.

rence in sheep as in oxen, for in their general management they are more exposed to the vicissitudes of the seasons, and hardened against the influence of sudden atmospheric changes. Nature has also given to them, for their own benefit and for ours, a thick coat of wool, which, under ordinary circumstances, may bid defiance both to cold and wet; yet there are times when they seriously and fatally experience the benumbing effect of the former.

The ewe, at yeaning time, enfeebled by the process of parturition, and, consequently, more than usually susceptible of impression from external agents, and less able to struggle against those that are injurious, is carelessly left in a bleak and exposed situation. At night comes "a frost—a killing frost," and, as the Shepherd most accurately expresses himself, "she is chilled—*chilled to the very marrow.*"

The lamb just dropped is perhaps naturally weakly; or, if strong, suddenly changes the temperature of the mother's womb for one below the freezing point, and lies for hours on a bed of snow. True, nature has kindly given to these little ones, and to young animals of every class, a capability of resistance against much cold—a degree of insusceptibility to its benumbing influence; but the vital power must necessarily sink under an attack like this. The shepherd carelessly examines his flock at night; but he thinks not of the bitter, biting blast to which they will be exposed, and in the morning he finds some of them dead, and more deprived of all power of motion.

The heat is by degrees abstracted from these neglected and abused animals by the cold bed on which they lie and the cold air around them. It is abstracted far more rapidly than it can be supplied—the nervous influence of the organic system is withdrawn—the vital current is arrested—and life is fled. One universal palsy leads on to, or is another word for, death. If the vital influence ever returns, it returns slowly, and with considerably diminished energy. For many an hour, and often during many a day, the blood loiters, and the muscles are rigid, or their action is in a manner powerless; and then follows a compound of rheumatism and of palsy—the last predominant and most obstinate. After all, the lamb rarely regains his former condition and value; but continues a mortifying and disgraceful exhibition of the carelessness or inhumanity of the owner. How much has the farmer yet to learn with regard to the treatment of the lamb and its mother! In some seasons the mortality among these animals forms no inconsiderable item in the catalogue of his losses, and the circumstances which contribute to general agricultural distress.

There is a little art in treating these poor palsied beings, and particularly the young ones; for although they resist the cold longer than the adult animal, they have not strength to bear the re-action which often follows when the vital heat begins once more to be produced. The means of relief are simple, but they should be cautiously applied. The little patient should be put into a hamper and carried home, wrapped up in straw, and thus the scanty portion of warmth which continues about him will not be dispersed. After a while, he may be brought into a warm room, or placed at some distance from the fire: a little warm gruel may be adminstered, with some ginger; or if he does not soon begin to rally, a little ale may be added to the gruel. Nothing stronger should by any means be allowed. Moderate warmth is the principal restorative. As soon as the lamb begins to recover, and is able to toddle a little about, he should be returned to his mother, who, in the meantime, should have been removed to a more

comfortable place; and her care of him, and her milk will in most cases gradually accomplish a cure.

It often happens, however, that after the palsy of the limbs has disappeared, the digestive organs imperfectly discharge their functions. Diarrhœa —and of a kind difficult to arrest, and soon assuming a serious character— is a frequent consequence of this exhaustion. The best, and, indeed, the only safe and efficacious remedy, is the "sheep and calves' cordial," the composition of which will be found in the list of medicines at the end of this work.

Two or three months afterwards comes another dangerous season as it regards the lambs—the time of weaning; and especially if the weather should be cold. They are often turned into some distant, and, perhaps, upland pasture, in order that the mother and the young ones may be out of the hearing of each others' bleating; and that the food may not be too plentiful or stimulating until the lamb is somewhat accustomed to his new kind of nourishment. Notwithstanding every precaution, purging will often come on, and cold will be taken, and there will be weakness of the limbs generally, and especially of the hind limbs, and an approach at least to palsy, if not the actual disease. Possibly this may be somewhat connected with, or consequent upon, the state of almost abandonment in which they were left when newly dropped. The treatment in this case is very simple. If the weather or the locality demand it, they should be placed in a more comfortable situation—a purgative consisting of Epsom salts, with ginger, should be administered—and, after that, a dose or two of the "cordial" will usually set all right.

Proceeding from the lateral column of the spinal marrow, seen plainly enough at the commencement of the cord, and supposed from its apparent agency to be continued through the whole extent of the spine, are certain nerves which discharge a very different function from any that have yet been considered. They are independent of the will, and only so far connected with the nerves of motion and sensation as to derive assistance from them when the welfare of the system requires it. They preside over those motions which are essential to life. They are properly termed *the motor organic nerves*. By them the heart beats, and the lungs heave, and the stomach brings in turn every portion of the food into contact with the gastric juice, and the bowels propel their contents through all their various windings. It is easy to see how many a disease of every system is referrible to their morbid action, whether hastened or retarded, or rendered irregular, or suspended. There is no disease of the contents of the chest or the belly, which is not referrible to, or connected with, one or another of them. Diseases of this kind, however, will be best considered when the organs to which the organic motor nerves are distributed pass in review.

Once more, there is a fourth distinct class of nerves, the origin of which cannot be determined, for they pervade the whole frame—the *sympathetic* or *ganglionic* nerves. The principal branches proceed from a ganglion, or nervous enlargement, at the upper part of the neck, and at the base of the skull. They connect themselves more especially with the blood-vessels. They can be plainly traced over them, until they elude the eye from their minuteness; and they are supposed to accompany them through all their ramifications. They preside over the different secretions; they govern the vessels in which the processes of deposition and absorption are carried on, they direct the nutrition, the growth, and the decay of every part of the system. It is easy to see that these must be identified with, and have

the greatest share in the production, and progress, and result of every disease: but it will also be evident that they, like the organic motor nerves, will be best considered, when the organs to which they are distributed are treated of *.

There is one disease, however, plainly of nervous origin, and connected with all the various nervous systems, which it will be convenient to consider in this place, namely,—

RABIES, OR MADNESS.

The extent of the mischief which a rabid dog frequently produces among sheep is almost incredible, especially if it is a sheep-dog, or has, at a former period, shown a disposition to worry sheep. Mr. Harris, to whom the farmer and the veterinary surgeon are indebted for the best account of this disease in sheep, says, that out of twenty-nine lambs in one flock, attacked by a lurcher, three only escaped; and more were bitten by him in different flocks, the greater part of whom were seriously injured. In three weeks thirty of them were dead, and nearly all of them before the expiration of the seventh week †.

The disease generally appears between the close of the second and the fourth week, but it has remained dormant until the eleventh week after the bite. The earliest symptoms peculiar to the sheep, are the following, and riding each other about—rams and wethers, and ewes and ewe-lambs. This continues a day or two, during which they occasionally feed, but are evidently losing condition. To this succeeds dulness or stupor, from which the ewes are rarely roused, but become paralytic, and die almost without a struggle. The lambs have a succession of convulsive fits, which carry them off in a day or two; but the wethers and the rams exhibit more or less ferocity, and in which the ewes occasionally participate. Some push their noses and faces against the ground, or thrust their heads against a hedge-bank: others have more method, as well as fierceness, in their madness. There is no disposition to bite, but they will nibble a stick when presented to them; and they will make good use of their horns or their heads, by attacking their fellows, or running violently against everything within their reach, until the skin is stripped almost entirely from their foreheads. To this follows a mucous discharge from the nostrils, and one of ropy saliva from the mouth, and, sometimes, a collection of froth and spume at the corners of the mouth. There is no dread of water, and there certainly is not the insatiable thirst that is often observed in the later stages of the disease in the dog. If they drink at all, it will be from the filthiest puddle that they can find. They will sometimes eat a vast quantity of dirt, and nibble the wood-work within their reach, and swallow the pieces. They are not like the dog, eagerly watching everything that takes place around them in the intervals of their peculiar delirium, but they are in a manner insensible to all that is going forward. The howl of the dog is characteristic of the disease; and the bleating of the sheep, and more especially of the lambs, is much altered: the key is higher, and the tone is more plaintive. Some sheep die on the second or third day, and few of them survive the fifth, the disease occasionally assuming in them many of the characters of inflammation of the brain.

The post-mortem appearances are often unsatisfactory. In some cases

* For a description of the origin, course, and functions of these nerves, see the Author's Lectures in the Veterinarian, for 1837.

† The Veterinarian, vol. viii. p. 498. Mr. Harris says, that some years ago, about twenty sheep were bitten by a dog, all of whom died mad.

there has been evident inflammation of the membranes of the brain, and slight congestion of its substance. There is nothing, however, about the brain that can be characteristic of the disease, and the lesions of it after death depend entirely on the accidental symptoms with which the disease has been accompanied. There is not always the inflammation and injection about the upper part of the windpipe, which is characteristic of rabies in the dog; this depends upon the quietness, or violent bleating of the animal, or the inflammation that has been propagated from the lungs to the windpipe and larynx. It is in the stomach that we must look for the decisive appearances, and they are often wanting even there. If the rumen is partially filled with dirt and filth, and sticks and stones; if an unusual and abominably fœtid smell is perceived, and the inner coat of the paunch is considerably inflamed, and that inflammation is in patches, and not continuous; and especially if there are small spots of extravasated blood, there can be little or no doubt that the disease was pure rabies. Some sheep, however, in which the disease was evident enough during life, exhibit no morbid lesion after death. No prevention of this disease is yet known except, at an early period after the bite, the removal of the wounded part by the caustic or the knife; but there can be no assurance that every wound has been discovered, except the animal is shorn all over. The wound will usually be situated in the ears, or the legs, or on the face. If it is found on the ears they must be cut off below the bite—if it is on the legs or the face, the pointed end of a stick of the nitrate of silver must be introduced into it, and brought thoroughly to act upon every part of it. If there is any doubt as to this being thoroughly effected, the wound must be enlarged with the knife, so as to afford free access to the caustic; and then, were it certain that every portion of the wound had been acted upon, and that there were no other wound, all danger would be removed: but can any one venture to say, even after the sheep has been closely shorn, that there is no other minute scratch? and if there should happen to be the smallest possible one, it is as dangerous as a lacerated wound.

There is another consideration that should have its due weight. If only a day or two have elapsed since the bite, the sheep may be fairly and honestly sold to the butcher. They may not be in the usual market condition, but they are worth something, and the pasture will be ready for other animals; but, the virus having once entered into the circulation, or symptoms of rabies having appeared, fairness and honesty forbid that the flesh should be used for human food.

There is yet another question. In what proportion of the flock is the malady likely to appear? It will probably attack almost every sheep that has been bitten; and in a small flock scarcely one will escape. "All that were bitten," says Mr. Harris, "whether much or little, were sooner or later affected; and in about five weeks all were dead*." Common sense, and common prudence, therefore, indicate the slaughter of the sheep the moment there is strong suspicion of their having been bitten.

As for *cure*, that is altogether out of the question. There are many drugs that have some influence over the disease—they will modify or alleviate the symptoms—they will somewhat retard the approach of death—but not one of them will effect a cure; and that farmer is incurring fruitless expense, and considerable danger, who administers any of the pretended nostrums for the cure of madness.

Is there any danger of the disease being communicated to those who

* The Veterinarian, vol. viii., 499.

handle the sheep, from some of the virus remaining on the wool, and coming into contact with a sore or wound? There is not an authentic case upon record in which rabies has been thus propagated; but it has been communicated by the virus of the ox, the horse, the ass, the human being, and, some authors say, the hen and the duck. It is probable that the virus of every rabid animal will propagate the disease; but it may possess different degrees of virulence, and it seems not to be so dangerous in the herbivorous and the ruminant animal, as in the carnivorous one. The danger may be comparatively little, but it does exist; and it behoves those who have the handling of sheep, in such circumstances, to be very much on their guard.

Having thus disposed of the diseases of the nerves of voluntary motion and common sensation, and likewise taken a brief glance at those of organic motion, and of secretion and nutrition, it remains only to consider those of peculiar sensation, or confined to one kind of sensation alone, as the nerves of smelling, seeing, hearing, and tasting.

THE SENSE OF SMELLING.

The olfactory nerve, by which the impressions made by odoriferous bodies on the membrane of the nose are conveyed to the brain, arises, as in the horse and the ox, from two roots,—the one from the outer part of the *corpus striatum*, the other from the under and anterior part of the *corpus callosum*. These pass forward, united yet distinct, until they reach the cribriform plate of the ethmoid bone—(fig. H, p. 384.) The pulpy mass of which each is composed passes through the perforated bone, yet still distinct. They are clothed with dura mater, in order to defend them through the short course they have to pursue. The portion proceeding from the corpus striatum spreads itself on the membrane covering the turbinated bones, (figs. 13 and 14, p. 384,) while the other ramifies on the membrane of the septum of the nose—the cartilaginous division between the two nostrils.

The cause of this double root, and the different termination of the two branches, is unknown. The membrane of the septum, and that of the turbinated bones, may be endowed with sensibility to different kinds of odours. The upper part of the nostril seems to be the true seat of the sense of smell, and the bones which are found there are developed in size, and, consequently, receive more nervous influence in different animals in proportion as acuteness of smell is necessary to their preservation and comfort. The ethmoid bone is considerably developed in the horse, because in a state of nature he is wild, and the faculty of distinguishing between nutritive and poisonous plants is indispensable to him. The ox is not so domesticated as the horse. He has more occasion for acuteness of smell, and particularly in the early part of the spring, when the plants are young (see CATTLE, p. 273, fig. *r*): this bone is larger in him. The sheep is still less domesticated, and in many parts even of the British islands wanders almost wild and abandoned: it is still larger in him than in the ox, and seems to fill the superior portion of the nasal cavity.

The turbinated bones (fig. 13, 14, p. 384.) bear evident relation, in their development, to the necessity of an acute sense of smell in different animals. The construction is nearly the same in all. They present a labyrinth of intricate cavities, pierced on all sides with numerous perforations, through which the membranes, and the ramifications of the nerves, freely pass. They are more developed in the ox than in the horse; and in the sheep, and particularly the lower turbinated bone, they are so large as

to fill up, as it were, the whole of the cavity, thus accounting for the readiness with which this animal is *blown*, if he is hurried only in a slight degree. Gasparin, describing the French sheep occasionally exposed to the attack of the wolf, assigns another reason for the development of these organs of smell. "Their sense of smelling is acuter than that of most of the domesticated animals, as will appear from the immense distance at which they can scent the approach of a wolf, and the terror which they express by a thousand movements. It is on that account that the nasal fossæ are so large in the sheep*."

The acutest observer of these animals has not, and could not probably detect in any of them the loss or the suspension of the sense of smell; but the farmer has often to deplore that want of discrimination between wholesome and poisonous food, which has caused considerable destruction in his flock. Nature gave to every animal the power of distinguishing one plant from another by its scent; but it was left to the tuition of the mother, to a very great extent at least, to teach the young one what peculiar smell, or want of smell, designates a wholesome plant; and what as plainly marks an injurious one. For a while the lamb subsists entirely, or almost so, on its mother's milk, and nature designed that it should be accustomed to its after-food by her side and under her tuition. If, from ignorance, caprice, or because the farmer thinks he can bring his lambs, or their mothers, earlier to the market, he separates the one from the other, and turns out his young stock, inexperienced and untaught, they will eat indiscriminately of every herb that presents itself, and many of them will be lost; and he must take the consequence of his folly or his avarice. This is a point of agricultural economy not sufficiently attended to.

THE ORGAN OF SIGHT.

For a description of the mechanism of the eye the reader is referred to the treatise on the Horse, published by this Society (p. 84). It is nearly the same in all our domesticated animals. There are, however, some minute points of difference; and breeders and graziers are accustomed, and rightly, to pay so much attention to the appearance of the eye of the sheep, that the subject must not be quite passed over. The first peculiarity in the eye of the sheep is its projection, both forward and laterally. This is occasioned by the development of the frontal bones of these animals, in both directions, in order to afford sufficient space for the attachment or origin of the horn. The forehead of the sheep has, on this account, a greater breadth than that of most other animals, and the eyes have a prominent appearance. The consequence of this prominence is, that the orbit of the eye is occasionally fractured. If the fracture is serious the sheep should be immediately destroyed—if there is not much displacement of the bones, nature will usually set all right. The orbitar process abuts upon the superior bifurcation of the malar bone, as it does in the ox, and has no connexion with the temporal bone; and, deep in the hollow behind and beneath the eye—the temporal fossa—the lateral development of the parietal bones in these animals causes a singular displacement of structure.

The eyes are protected by lids of a similar construction with those of other animals. An œdematous state, or swelling of the lids, is one of the indications and accompaniments of the rot. If, however, there should not be the few enlarged, pale, venous blood-vessels in the inner corner of the eye which uniformly attend the early stages of the rot, this may be a mere

* Gasparin des Malad. Contag. des Bêtes à laine, p. 35.

local affection, and a few applications of weak camphorated spirit will generally remove it.

Inflammation and soreness, and enlargement, and sometimes eversion of the tarsi, or the edges of the lids, will be the accompaniment or the precursor of scab. It is rare to see confirmed scab without sore eyes, and sore eyes are almost invariably followed by scab. The proper constitutional means and local applications must be resorted to in order to cure this disease; but a weak solution of the sulphate of zinc may be applied to the lids.

From the same cause, and at the same time, the eye-lashes are apt to fall off. Any weak mercurial ointment, or lard with a twentieth part of calomel, may be applied in this as well as in the former case, in order to cure the scorbutic affection, and to prevent the lids from adhering together. Should a scabby eruption, beginning on or about the lids, spread over the face, it is akin to, or is a species of scab, and resort must be had to the mercurial ointment considerably lowered. When the bulbs or roots of the eye-lashes have participated in the superficial disease, and have been destroyed, as is too often the case in scab, the surface may be healed, but the hair will never grow again: but when, although the lashes have fallen, the bulbs remain uninjured, a little oil or emollient ointment may be applied to prevent adhesion between the lids, and nature will restore the hair without the interposition of art.

Warty tumours occasionally form on the eyelids, and particularly on the upper lid. When they are small they should be touched a few times with the lunar caustic. If they are larger, they may be snipped off with a pair of scissors, and the caustic applied to the root. When neglected, they are apt to degenerate into tumours of different kinds, and that will attain a very considerable size. The author lately removed one from the upper eyelid of a Wallachian ram that weighed more than two ounces. The portrait of this ram is given in page 138.

The caroncle, the puncta lacrymalia, the lacrymal sac, the lacrymal gland, and the haw or membrana nictitans, and their diseases too, are so similar to those of the ox, that, in order to avoid repetition, reference is made to the volume on "Cattle."

The eye of the sheep should be of a middle size, quick in its motion, and clear. The conjunctiva or white of the eye should be of a light pearl colour, with a few minute red blood-vessels towards the inner angle, and the caroncle, or little protuberance in the corner of the eye, of a healthy red appearance. A paleness of the caroncle, and the appearance of a few distended vessels, and perhaps of a yellow colour in the neighbourhood of it, are sure indications of the approach or the establishment of rot.

The form of the *pupil* is nearly the same as in the horse; it is horizontally elliptical. The *iris* is of a lighter colour, and there are no corpora nigra, or small black bodies, depending from the upper edge of the iris. The internal part of the eye is also of a lighter colour. While the lighter coloured part of the interior lining membrane of the eye is of a bluish or pea-green in the horse, and green in the ox, it is of a yellow-green in the sheep. It is adapted to the wants of the animal, who is more abandoned to the darkness, and, in many countries, the dangers of the night, than the horse and the ox, and requires a brighter reflecting surface, in order that surrounding objects may be rendered visible. The conjunctiva, or anterior transparent membrane covering the eye and lining the lids, is subject to as frequent and destructive *inflammation* as that of any other domesticated animal, and an inflammation that rapidly spreads to and disorganizes the eye and destroys the sight.

A more frequent consequence of inflammation of the conjunctiva in the sheep, than in any other animal, is adhesion between one or both lids and the ball of the eye. The surfaces of both becoming excoriated, numerous granulations are quickly produced which unite them together. This is particularly the case when the eyes have much partaken of the general inflammation of the external integument in scab; and it has also occurred when the conjunctiva has been too deeply scarified in order to abate inflammation, or when the scarification has been performed with an unclean instrument. Inflammation of the eye, occurring either when there is scab, or a tendency to scab in the sheep, is the common cause of it. The motion of the lids is more or less impeded, and there is partial or total blindness according to the extent of the adhesion. There is but one remedy for this complaint, namely, to separate the united membranes. In countries where the scab prevails, and this kind of blindness is of frequent occurrence, the shepherd has always in his pocket a bit of hard wood, well polished, and in the shape of a very small paperknife, which he introduces when there is any opening between the membranes, or at the outer angle of the eye if the adhesion is extensive, and so forcibly breaks down the union. He often finds considerable difficulty in this, from the motion of the eye and the impatience of the sheep; but this minute spatula is a safer instrument in his hands, and perhaps in those of the veterinary surgeon, than the bistoury or the scissors. Having liberated the eye, he washes it well with a decoction of mallows or poppyheads, or introduces a little oil in order to prevent renewed adhesion.

It has been said that periodical ophthalmia—inflammation of the eye which disappears and returns at uncertain intervals until cataract is produced—is a disease peculiar to the horse. They understood not the diseases of sheep who believed this. There seems to be no animal more exposed to the attack of inflammation—the slighest catarrh is frequently accompanied by it—it appears in the interval between washing and shearing—it very commonly follows the shearing—it is produced by every change of weather, or improper exposure to cold after shearing, or indeed at any time—it is the consequence of over-fatigue, or of long journeys through dusty roads—it is the attendant on scab, on redwater, and on blood. It suddenly occurs without any apparent cause—the animal is *lark-spurred*. The old shepherds used to say that the sheep having trodden upon a lark's nest, the old one, like a game chicken, had spurred the intruder in the eye, and struck it blind*. *It was a sudden attack of ophthalmia.* The shepherd does not often trouble himself to observe it, or if he does perceive it, he meddles not with it. If there is considerable discharge from the eye, and he is a humane and intelligent man, he bathes it with warm water, or with some favourite decoction; or he takes a little blood from the vein at the angle of the eye; or, if he is an ignorant and brutal fellow, he blows some soot, or sugar, or powdered glass into the eye. After a while the eye clears up, and the disease has seemingly disappeared. This is only a treacherous respite. The inflammation is still lurking, or a tendency to it; and ere many weeks have passed it returns, and more violently than at the first attack. The internal parts of the eye now become affected, and *Cataract* is soon established. There are few flocks in an exposed and cold situation in which a tenth part of the sheep at least have not cataract in one eye, and there are many more blind sheep than a stranger would imagine†. "It is wonder-

* Lawrence on Cattle, p. 628.

† It is a curious circumstance that when inflammation in the eye arises from some constitutional cause, and runs on to cataract, the right eye is much more frequently lost

ful," says Mr. Hogg, "that although a great number of individuals of a flock go quite blind, very few of them will stray from their own walk; nay, unless they lose themselves during the first three days, they are as sure to be found at home as any of the parcel. Their necessity teaches them a wonderful sagacity in following the rest of the flock by the scent," and, as has been already quoted, "a friend generally attaches itself to the sufferer, waiting on it with the most tender assiduity, and by its bleating calling it back from danger, and from going astray *."

Another species of blindness is common among sheep, GUTTA SERENA, or palsy of the optic nerve. It is a frequent accompaniment of turnsick, and also of apoplexy. It is not easily recognised, for the transparency of the eye remains, or is increased; but the optic nerve is pressed upon by some mechanical cause within the brain, and the retina is palsied. There is no remedy here. In their encounters with each other, and exposed as the eye is from the peculiar form of the frontal bone and of the orbit, it is much in danger, and frequently suffers. An instance lately occurred in the practice of the author, in which the blow taking place on the orbit, the transparent cornea was split from one angle of the eye to the other, in a polled ram, and the crystalline lens escaped. The eye was frequently fomented with warm water, and in the course of a fortnight seemed not to give any pain to the animal, but it gradually wasted away, and the lids are nearly closed.

In two or three cases the eye has been removed, when it became enlarged and cancerous; it has been punctured when dropsical; and many an operation might be performed for its relief or cure, if veterinary surgery were carried to the extent which the interests of the farmer evidently require. At present the sheep-owner very naturally sends the sheep at once to the butcher rather than permit it to suffer and waste away under those diseases which baffle the simple means and knowledge of the shepherd.

THE ORGAN OF HEARING.

The form and size and position of the ear in sheep differ materially in different breeds. This has little reference to the time, whether late or remote, at which the different breeds were first domesticated†, but is intimately connected with the general form and the locality and habits of the animal. The Argali (see cut, p. 132) and the Mouflon (p. 133), which are considered by some writers as the prototypes of the present race of sheep, have small and erect ears. They inhabited the mountainous regions —they were exposed to numerous dangers—they had never enjoyed the protection of man—and to their agile and active make they added a quick-

than the left one. This does not seem to be confined to the sheep, nor to the ruminant, but is the case with animals of almost every kind. The Zoological Society of London has many animals in its menagerie afflicted with cataract, and in rather more than three cases out of four it is the right eye which is affected. This is an interesting fact for the consideration of the physiologist.

* Hogg on Sheep, p. 118.

† Livingstone, on Sheep, p. 142, and Kirby, in the Bridgewater Treatises, vol. i. p. 61, take up the same idea. Kirby says that "in the wild state the ears of the horse lie back, and in the domesticated they are erect." They are erect in both, in the natural and unexcited state, but the superior and untamed spirit of the wild horse gives to his ears—the organs by means of which he most frequently and eloquently discourses—a greater range of motion than is often observed in the domesticated horse; and in some moment of unusual playfulness or deviltry they may be, and are, laid flat on the neck. It is strange that this gentleman had not drawn the conclusion that they are naturally upright, for he acknowledges that in all the ancient sculptures, and even those of Egyptian origin, he finds them so.

ness of hearing necessary to warn them them of the approach of foes, and for which the ear—light, and quickly moved in every direction—was admirably adapted.

The Abyssinian or Persian sheep (p. 23), the fat-tailed (p. 114), and the fat-rumped sheep (p. 20), have large and pendulous ears. They are inhabitants principally of the plains, they have fewer foes to dread, and they have been from the earliest period under the dominion and the protection of man. At the present period the Wallachian ram (p. 138) has small and erect ears; he is an inhabitant of the mountains, and has enemies to dread and to provide against; and so has the Iceland sheep (p. 168), and for similar reasons; but the inhabitant of the sandy plains of Southern and Central Africa (p. 121) has the ears so lengthened as to constitute no little deformity. He can see his enemies long before they approach him, and secure his safety by flight.

In the British empire the horned Welsh (p. 274), the black-faced sheep (p. 280), and the Southdown (p. 233), preserve the true small and erect ear. They have no foes to dread, but they are inhabitants of the hills; they are apt to wander away from each other, and often listen for the bleatings of their companions: while the Teeswater (p. 329) in his long and pendent ears bears the impress of a lowland sheep. The Kentish (p. 336) has got rid of much of the bulky form of the ears, but retains their dependent position. The Leicester has been systematically endeavouring to rid itself of this badge of inferior breed. The lop-eared breeds of the middle and western counties have ceased to exist.

A large ear is connected, in the mind of the modern breeder, with a certain degree of unkindly disposition to fatten, or at least with slow fattening; and experience tells him that he is right in this association, and therefore, so far as he can, he selects a small and narrow head, and with that is necessarily connected a small or moderate-sized ear.

There is nothing peculiar in the internal structure of the ear of the sheep, nor any reason to suppose that the sense of hearing is more than usually acute in him. There are proofs, however, that he hears quickly and accurately. The mother will distinguish the bleating of her own lamb from that of any other in the flock, and immediately respond to it. Neither the shepherd nor his dog can steal upon the flock, and take it by surprise; and the accounts—undoubtedly true—of their being conscious of the approach of the wolf at a considerable distance, are better explained on the principle of acuteness of hearing than of sight.

Of the diseases of the ear in the sheep there is little to be said; he has been too lately admitted a patient of the veterinary surgeon. The number and severity of wounds in the ear depend on the inhumanity of the shepherd, and the ferocity of the dog. If they are frequent and serious, the former ought to be dismissed, and the latter hung. When the dog executes his office with no needless cruelty, the shepherd may sometimes be permitted to rest while his quadruped servant is at work; but the system of dogging the sheep into obedience, in order that the lazy menial may be idle, deserves reprobation, and should be suppressed.

Inflammation of the lining membrane of the cartilage is of more frequent occurrence than is generally supposed, and may be recognised by the animal carrying its head low, and a little on one side, with, now and then, a half attempt to shake the head. Redness, heat, or ulceration, will be found. The ear should be well washed out with warm soap and water; and a weak solution of goulard, with a small quantity of laudanum, should always be at hand for daily use. The ear occasionally gets into a dreadful state dur-

ing the summer, and when the fly is troublesome, if ulceration of the internal part of it is neglected. The author was once looking over the flock of a friend who did not always pay sufficient personal attention to his sheep. One old ewe carried her head plainly on one side. He desired that she might be caught. There was a table-spoonful of maggots in the ear. Insects sometimes find their way into the ear; but nature has given to those animals who bite so close to the ground an additional quantity of wax as a defence against the intrusion of these tormentors.

THE ORGAN OF TASTE.

The sense of taste may be said to be placed on the surface of the tongue, and it is presided over by the gustatory branch of the fifth pair of nerves. It is probably not very acute in the ruminant, the selection of the food depending mostly on the smell. This sense is most called into exercise or contributes most to the pleasure of the animal in the rumination or re-mastication of the food, and his countenance and manner are then strongly expressive of quiet but real enjoyment *.

The nervous system has been described as that to which all sensation is referred, and from which all voluntary motion is derived; and also as governing the involuntary motions of the frame, and under the influence of which every function connected with the nutrition and welfare of the body is discharged. In order, however, that this mysterious power should be duly, or at all exerted, the presence of arterial blood is necessary. Prevent its circulation through the brain and through the organic nerves, and the machine stops in a moment.

The reason of this will be matter of future inquiry, but it will be necessary previously to examine into the nature, source, and action of this all-important—this indispensable fluid. It is principally derived from the chyle, that mass into which the different alimentary substances are reduced by the digestive power of the stomach. The chyle is poured into one of the large blood-vessels near the heart, and as it reaches the heart it mingles with another fluid composed of all the worn-out parts of the body. These fluids unite with the general mass of blood; they doubtless undergo certain changes by mere admixture with the blood, and in union with it they enter the heart, and are driven by that organ through the vessels of the lungs: there they undergo their last purifying and vivifying change, and are returned from the heart—true arterial blood, by the influence of which the whole machine is set at work. Then there are various things to be inquired into—the nature of digestion, by which the food is converted into chyle—the structure and function of the absorbents by which the second fluid is furnished—the circulatory power of the heart—the change which the blood undergoes in its passage through the lungs, and the composition and function of the arterial blood.

* If, however, the following anecdote can be depended upon, and there seem to be those localities connected with it which give considerable confirmation to it, the sheep may acquire a perverted taste to as great extent as any biped. "There is at present in Mr. Archibald Kemp's spirit establishment in Charlotte Street, Edinburgh, a sheep that goes by the cognomen of 'Willy,' and if any of the customers in the house cry, 'Willy! here's a glass for you,' he will come forth obedient to the summons, and swill his bumper with the most inveterate toper present. Nor is this all; for Willy sometimes turns his owner's spirit cans, when he thinks he is not observed, and helps himself. Whisky, ale, and porter, come alike to him. He will open a snuff-box without assistance, and speedily empty the contents, and chew a quid of tobacco, and drink a glass of grog, with as much satisfaction as any jolly tar in his Majesty's Navy." The construction of Willy's stomach certainly gives him a decided advantage over all his competitors, and he would find no difficulty in fairly beating any biped in these feats—gormandizing and drinking.—*Scotsman.*

Chapter XI.

THE DIGESTIVE FUNCTION.

The instruments by which the sheep when at pasture gathers his food are the lips, the teeth, and the tongue. These are enumerated in the order in which they are placed in the head of the animal :—

THE LIPS.

The tongue, except the herbage is exceedingly short, collects the grass together, and forms it into a kind of roll, in order that it may be better seized between the pad in the upper jaw and the incisor or cutting-teeth of the lower jaw. The lips of the sheep do not lend so much assistance in effecting this as is derived from those of the ox, for the upper lip is almost cleft through at the centre, a dense membrane alone holding together the divided portions of it.

The intention and the advantage of this cleft form of the upper lip must be immediately evident. The sheep is often the last animal upon the pasture. That which the horse in his haste neglects to gather, and which the ox lazily passes over, is collected by the more active and diligent sheep. Many breeds of them were designed by nature to browse on the downs and the hills and the mountains, where the grass scarcely rises above the surface of the ground; and, more than this, the sheep was destined not only to consume that which would otherwise have been lost, but actually to improve that pasture which other animals would impoverish. He crops close to the ground; he cuts off those shoots, the loss of which disposes the plant to throw out others more numerous and more nutritious. For one that he nips off a dozen succeed; and the most ready way to improve some pastures, and especially the usual pasture of the downs and the uplands, is to turn a flock of sheep upon them, to stock them close, and to let them be eaten bare. The sheep being then removed, a new herbage will spring up, thicker and closer, and containing more nourishment. Therefore is the upper cleft lip given to the sheep that he may be enabled to discharge his destined duty.

The lips being brought so closely in contact with the ground, need some defence from the annoyances and injuries to which they would be subject. Hence arises the difference in the upper lip between the sheep and the ox. Feeding farther from the ground, the dewy surface of the upper lip and the length of the tongue afford sufficient protection to the ox. To the sheep is given a dense coat of hair, covering the whole of the lip except the bottom of the cleft, and from which spring several longer and shorter hairs, resembling and answering the purpose of whiskers. Scarcely any wet, no insect, and no dirt can penetrate this thick and compound coat.

This being the construction of the upper lip, and the lower one having its usual coat of hair, there must be even less sensibility in the lips of the sheep than in those of the ox; yet from the smallness of the muzzle, and its degree of pointedness, it is used much oftener, and more effectually, as an organ of touch by the former than by the latter.

The portion denuded of hair is very much smaller in the sheep than in the ox. It is somewhat of a triangular shape, containing the nostrils above, and terminating in a narrow channel that communicates with the cleft in the upper lip. Considerable moisture sometimes stands upon it, or exudes from it, and the superabundant fluid trickles down the cleft of the lip.

The shepherd does not handle his sheep so frequently as the herdsman does his cattle, and he regards the general expression of the countenance in the sheep as the best indication of health or disease; yet if he is not guided by the coldness of the muzzle, he does not overlook the greater or smaller quality of dew which may be collected on it, and he forms the same conclusion as the herdsman, that while the muzzle is moist, *i. e.*, while the natural secretions are going forward, there is no great constitutional disturbance, and consequently no great danger: but in proportion as that secretion is lessened there is general sympathy with some local affection; and when it becomes altogether suspended it is an indication of so much universal derangement that it behoves him to be upon his guard *.

THE TEETH.

The reader is referred to the account of the teeth, already given at page 3, principally as indicating the age of the animal, but also with reference to the function now under consideration. The sharp edge of the incisor teeth, and also their gouge or scoop form, admirably adapt them for cutting through the harder and fibrous portions of the grass, which generally fall to the lot of the sheep. The fibres of the grass are partly torn and partly cut in the curious nodding action of this animal when grazing, while the pad of the upper jaw, firmer and denser than in cattle, receives no injury.

Another provision of nature begins to appear in this ruminant, and which is more fully developed in those that are in a less domesticated state, and doomed to feed continually on the coarse and dry herbage which the uncultivated land produces. The author's friend, Mr. Percivall, in his excellent work on the "Anatomy of the Horse," describes the Gums as consisting of "dense, compact, prominent polished masses of the nature of periosteum, rendering the teeth and their sockets inseparable by any but extraordinary mechanical force." In the sheep "the teeth and their sockets are inseparable by any but mechanical force," yet the substance of the gum is not so compact; the incisor teeth are to a very slight degree moveable, and their line of inclination can be somewhat changed; *i. e.* their cutting edges admit of some degree of adaptation to the different or changing position of the food which is to be cropped. This is still more evident in the deer, and in one of the largest of the ruminants, the giraffe, they have a feeling of absolute looseness. In dissecting a Virginian deer, the author imagined that he discovered a kind of muscular structure in the gum supporting the incisor teeth, by means of which the animal might have the power of adapting them to the form or position of the food. This had not hitherto been observed, because these animals had not been sufficiently examined in their living state, even by professed naturalists and anatomists. The advantage of this provision in quadrupeds that have but one row of incisor teeth is sufficiently evident. In the horse it would be an evil, for the cutting edges of the upper and lower teeth could not be retained in exact opposition to each other; but when there is an elastic pad in the upper jaw, the power of thus adjusting the teeth to the object that is to be cut must be highly advantageous, and especially if controlled by the joint influence of a dense periosteum-like matter, and a powerful muscular structure. It is probably on account of this construction of the gums that in many diseases of ruminants, and especially in the epidemics of sheep and cattle, and all affections of the mucous membranes of the respiratory and the digestive passages, the teeth often become loose, and occasionally fall out.

* "Cattle," p. 316.

THE TONGUE.

This organ occupies, as in the horse and cattle, the base of the mouth, and is also held in its position by muscles principally derived from the os hyoides. Its construction and its uses are the same as in cattle, but it does not possess the same comparative length as in the ox. The muzzle of the sheep, although brought nearer to the ground in the act of grazing, is securely protected from annoyance and injury by the hairs which naturally cover it, and therefore the tongue is not so much required in order to clean and to defend it.

The appearance of the tongue is not so closely connected with or indicative of certain species and changes of disease in the herbivorous animal as in the carnivorous one, and in the human being. The partial cuticular coat of the stomach of the horse, and the complete one of the three first reservoirs of the ox and the sheep, will sufficiently account for this; yet more information is to be gathered from the tongue than the sheep-master or the veterinary surgeon imagines.

The tongue of the sheep, unnaturally red throughout its whole extent, is the frequent accompaniment of inflammation of the serous membranes, whether pulmonary or peritoneal; and raises apprehension of the existence or approach of that most fatal of all diseases, *redwater*, or bloody effusion in the abdomen. If there is considerable redness round the edges of the tongue, but the colour is paler in the centre, there is more fear of inflammatory affection of the mucous membrane of the intestines, and its possible termination in dysentery. A pale tongue, lightly tinged with yellow, raises suspicion of the rot. If the yellow is darker, and approaching to a brown colour, there is probably acute inflammation of the liver. If it is approaching to purple or to black, there is that affection of the bowels which accompanies typhoid disease; and the darkening or the clearing away of which will be the sure harbinger of death or recovery. A little observation would lead to many a useful hint with regard to the diseases of the digestive system at least.

GLOSS-ANTHRAX, OR BLAIN.

Sheep are liable, although not so much as cattle, to that inflammation of the tongue, or rather of the cellular tissue on the side of and under the tongue, to which the above singular names are given. A few sheep in the flock are occasionally attacked by it, or it appears under the form of an epidemic. A discharge of saliva runs from the mouth; at first colourless and devoid of smell, but soon becoming bloody, purulent, and stinking.

The head and neck begin to swell, and the animal breathes with difficulty, and is sometimes suffocated. A succession of vesicles have risen along the side of the tongue—they have rapidly grown—they have broken—they have become gangrenous—they have formed deep ulcers, or deeper abscesses that occasionally break outwardly. When this is the case it is probably the "Greathead" of Mr. Hogg, described in page 371.

The cause is some unknown atmospheric influence; but the sheep have been predisposed to be affected by it, either by previous unhealthy weather, by feeding on unwholesome herbage, or by unnecessary exposure to cold and wet.

Whatever may be the case with regard to cattle, there is no doubt that the blain is often infectious among sheep. The diseased sheep should immediately be removed from the rest, and placed in a separate and somewhat distant pasture.

The malady must first be attacked locally. If there are any vesicles in

the mouth they must be freely lanced. If any tumours appear on the neck or face, and that evidently contain a fluid, they must be opened. The ulcers must be bathed with warm water at first, and until the matter is almost evacuated—then lotions of cold water, in each pint of which one drachm of the chloride of lime has been dissolved, must be diligently used. Aperients must be administered very cautiously, and not at all, unless there is considerable constipation. The strength of the animal must be supported by any farinaceous food that it can be induced to take—linseed mashes—bran mashes with oatmeal—and the best succulent vegetables, as carrots and mangel-wurzel; plenty of good thick gruel, if necessary, being horned down, and two drachms of powdered gentian root and one of ginger, with four grains of powdered cantharides, being given morning, noon, and night. Bleeding will be very proper in this disease before the vesicles have broken, or the external tumours begun to soften, and there is an evident and considerable degree of fever; but after the purulent, fetid matter has begun to appear, it will only hasten the death of the animal.

APHTHA, OR THRUSH.

No English writer on the diseases of sheep has noticed this complaint; yet the shepherd has often observed it, and it has probably existed when he was unconscious of it or of its nature. A sheep is dull, and off his feed—he ceases to ruminate—he wanders about unhappily—he sometimes thinks of browsing, and attempts it, but after a feeble effort he gives the matter up. If he had been watched a little more closely, several small vesicles would have been found in his mouth, and a slight discharge of viscid saliva would have been seen. There is very little or no danger about this; but it teases the sheep for a while, and takes him off his food, and gets him a little out of condition. The mouth being washed two or three times with a weak solution of alum, or diluted tincture of myrrh, and a couple of ounces of Epsom salts being administered, the eruption disappears.

There is often a curious coincidence between thrush in the mouth and foot-rot, when the latter has run to ulceration and fetid discharge. Possibly the sheep may have rubbed the diseased foot with his muzzle, or he may have licked it, and the mouth has become filled with vesicles; or it would almost seem that there is a connexion between thrush and foot-rot. The sheep with foot-rot should be carefully watched, and if they refuse to feed—if a ropy slaver runs from the mouth—they should be examined, and the simple and effectual remedy already stated applied. Many a sheep-master will recollect the coincidence of occasional refusal to feed, and the existence of foot-rot. He will now better know how to understand and prevent it.

Paulet, in his valuable work on epizootic disease, describes it as having frequently occurred as an epidemic among sheep, and to have been exceedingly fatal. In 1745 it broke out in France. Little vesicles appeared about the nostrils and lips and other parts of the head, and the inflammation was rapidly communicated to the lungs by means of the mucous membrane of the windpipe. It was at length arrested in its career by the diligent ministration of the following medicine: two ounces of crude antimony, the same quantity of nitre, four ounces of sulphur, and a like weight of bay-berries—and all these mixed with ten pounds of salt; a portion of this was put into the troughs, and the animals licked it when they pleased. The reader will rather conclude that the epidemic had worn itself out, and had ceased of its own accord*.

* Paulet, Recherches sur les Maladies Epizootiques, vol. i. pp. 150, 251.

In 1764 it decimated the Moravian flocks. A learned physician who carefully watched the progress of the epidemic gave a description of it resembling thrush in its character, only much aggravated. The patient lost his usual spirits—there was heat of skin, more or less redness of the eyes, the mouth was redder than usual, the breath was hot, and the animal refused his food. These symptoms were insensibly aggravated. On the second, or third, or fourth day, pustules appeared in the mouth, the nose, or the gullet, which rendered the act of swallowing so difficult, that liquids could scarcely be got down, and the patient lost condition with fearful rapidity. The bladders often seemed to occupy the whole of the mouth and the gullet. On or about the seventh day the scab peeled off in favourable cases, and *when the thrush began to subside, tumours of a larger or smaller size appeared at the posterior part of one or both fore-feet.* If the tumours on the foot commenced before the disappearance of the thrush, every unpleasant symptom of the original disease ceased, and the thrush vanished with much rapidity; but the lameness returned, it fearfully increased, and the greater part of the sheep lost their hoofs*.

There is a disease known to the shepherds in some parts of this country, and more especially on the Continent, by the name of "black-muzzle." It is a pimpled or scabbed eruption about the nose of the sheep, sometimes extending up to the eyes and ears, encircling the former and covering the latter. It oftener attacks the lamb than the full-grown sheep; and sucking lambs more frequently than those that are weaned. It is attributed to various causes, as feeding among the stubbles, or on stony ground, or the teats of the mother being chapped or filthy. It can scarcely be considered as a kind of scab, for either it is not infectious, or in so slight a degree only, that it is rarely necessary to separate the diseased sheep from the rest of the flock. The application of a little mercurial ointment very much lowered with lard, or of the common sulphur ointment with a twelfth part of mercurial, will speedily effect a cure.

THE SALIVARY GLANDS.

As in the ox, the food when first gathered by the sheep is hastily swallowed before it has time to be much impregnated with the moisture of the mouth; but when it is returned for rumination a considerable supply of saliva is required in order to assist in reducing the food to that comminuted and pultaceous state in which it must be submitted to the action of the gastric juice in the true stomach. This saliva is procured, as in the horse and cattle, from three distinct sources or glands, denominated, according to their situation, the parotid, the submaxillary, and the sublingual glands.

The parotid gland is situated at the base of the ear, in the space between the head and the neck, and reaching from the ear to the larynx. It consists of a great number of minute glands, united together by cellular tissue, each having its own little duct to convey away the saliva as it is secreted. These

* Sagard, Libellus de Aphthis Pecorinis. Viennæ, 1765. Columella, about the year 40 of the Christian era, a valuable writer on agriculture, and particularly on sheep husbandry, speaks of a similar disease prevailing in his time, and often assuming an epidemic character. It consisted of malignant ulcerations about the lips and in the mouths of lambs. He considered that it was produced by eating of grass covered with hoar-frost, the tender mouths of these animals not being able to bear the intense cold of the herbage. It was fatal to the greater part of the lambs that were not weaned—*tabes exitifera lactentibus.* The remedy was, to take equal portions of the juice of hyssop and of salt, and to rub the mixture well into the parts affected, and afterwards to apply an ointment composed of tar and lard. See also Paulet sur les Malad. Epizoot., vol. i. p. 56.

join to form one main branch through which the stream is conveyed into the mouth. It is the gland whence the principal part of the saliva is obtained. It is in full action while the animal is browsing, or the process of rumination is carried on, but it ceases when the jaw no longer continues to move. The secretion from this gland is conveyed to the mouth of the horse by a winding course behind the angle of the lower jaw; but as a more constant flow of it is requisite while the ox is ruminating, it takes a more direct course in him across the cheek. The sheep, biting so much closer than the ox, and its food being of a harder and tougher nature, a constant and a full supply is still more necessary to him; and there are generally two canals from the gland to the mouth, which unite a little before they reach the cheek, so that the supply is continued to him when, by inflammation or accident, one of the ducts may be inflamed or otherwise injured and closed—a circumstance to which he is peculiarly exposed from his browsing so near to the ground. This is another illustration of design which should not be quite overlooked.

Inflammation of the parotid gland is of frequent occurrence in the ox. There are few cases of severe catarrhal affection, and none of influenza, in which a swelling of the head and neck is not an early and a prominent symptom; and it is always dreaded because, although sometimes manageable, it is a sure indication in these animals that the disease is, or may soon become, of a typhoid character. It does not so often attack the sheep; and when it does appear, if the wool is carefully parted in two or three places, in the space between the angle of the jaw and the neck, and a strong hartshorn liniment (composed of two parts of hartshorn and one of sweet-oil) is well rubbed in, and two ounces of salts administered, the inflammation will disappear*.

The submaxillary gland—smaller than the parotid—is situated deep in the cavity between the branches of the lower jaw; and the duct which conveys the saliva secreted by it to the mouth opens on either side of the frænum of the tongue. *The sublingual gland* lies along the under part of the tongue, and is covered with the membrane of the mouth. The irregular surface of the under part of the mouth is caused by the corresponding form of the sublingual gland beneath. All these glands are, in proportion to the size of the animal, larger in the sheep than in the ox, for the reasons above stated; they are even larger than in many carnivorous animals of double the size of the sheep. The glands of the cheek are particularly developed, and also those which run along the floor of the mouth close to the molar teeth. In addition to these is a gland almost peculiar to the sheep, behind the lower jaw, and deep in the hollow which exists there, extending upwards as far as the fatty matter that encircles the eye, and opening on the palate opposite to and behind the last molar tooth.

* A few days before this was written the most beautiful of the giraffes in the menagerie of the Zoological Society of London was suddenly seized with this strangullion or inflammation of the salivary gland. He was perfectly well on the preceding evening, but when he was seen in the morning, there was an enlargement within the angle of the left lower jaw, and occupying almost the whole of the space between the jaws. It was hard, hot, and tender; and lower down, towards the point of the jaws, was a second tumour, smaller, but evidently containing a fluid. The medical attendant was alarmed, for he recognised at once the strangullion of the ruminant, and he well knew all its frequent and fatal consequences. Twelve hundred guineas had been refused for that animal a very little while before. He caused the part to be well and frequently embrocated with this liniment—he cheated the patient with a good dose of calomel in a small onion; he took away all his corn, and put him upon a carrot diet, and in a few days all was well.

M. Flourens, in some interesting but cruel experiments on the digestive organs of the sheep, has discovered a hitherto unsuspected use for this wonderful accumulation of salivary glands. He made an incision into the gullet of a sheep at the upper third of its neck, and he found that a prodigious quantity of saliva escaped through the upper part of the incision; and when the animal was dead, the contents of the paunch were perfectly dry. This was the case in a second experiment of the same nature; and therefore he concluded that the saliva was not only employed by the sheep in softening the food in the mouth and assisting in mastication, but also in softening or macerating it in the paunch, an operation which the dry and hard character of the food would often render necessary.

It is a pleasing proof of design that "the quantity of saliva secreted has always a relation to the nature of the food, the degree of mastication which it requires, and the mode in which it is swallowed *."

There are no diseases of the submaxillary and sublingual glands that are prevalent in the sheep, nor any vitiation of the saliva, that is not to be attributed to disease of other parts.

THE PALATE.

In the upper part of the mouth, and in the situation of the front incisor teeth in those animals that are not ruminant, is found, as has already been described, a dense yet elastic pad or cushion. Its place is marked by fig. 3, p. 384. The wise and kind design of this substitution has already been explained at p. 3. The palate is a continuation of the same substance, but thinner, and extending over the whole of the roof of the mouth. It does not, however, present a smooth surface, but there is a double row of prominences or bars running across the mouth, and separated from each other by a depression or furrow continued longitudinally in the centre of the roof. Each of these bars, on the side nearest to the back part of the mouth, has a border or projection of some considerable firmness, having a denticulated edge, and giving a hard and rough feeling to the palate when the finger is passed over it in a direction from the back to the fore part of the mouth. The intention of this is evident—namely, to afford no obstacle to the food when it is passing on towards the gullet, but a very considerable one to its return to the fore part of the mouth. This mechanism is rendered perfect by these bars being most projecting, and the borders firmest, at the middle of the palate, where the food would most readily escape.

Immediately behind the pad are two small apertures in the roof of the mouth, open also in that of the ox, but closed in the horse. They are seen between figs. 13 and 14 in the cut of the skull in p. 370. They lead to, and are connected with, two glandular substances, with a hollow in their centre, communicating with the cavity of the nose above. They receive a great many nerves and blood-vessels, and would seem to have to discharge some important office. They are larger in ruminants than in any other class of animals except the rodentia—the beaver, rat, hare, &c.—and they are altogether wanting in the human being. Their use has never been demonstrated, but they have an evident relation to the senses both of taste and smell. It is probable that they serve the purpose of guiding the ruminant to that kind of food which is wholesome, and warning him against that which would be destructive.

* Roget's Physiology (Bridgewater Treatises, vol. ii. p. 175).

THE VELUM PALATI AND PHARYNX.

The food is now brought to the posterior division of the mouth, and it passes readily over the tongue, from the back part of which a mucous fluid is secreted to envelope the pellet of food, and prevent it from abrading or otherwise injuring the organs over which it is to be carried. The velum palati or soft palate yields to the pressure upon it, and admits the pellet. In the horse the velum forms a perfect division, in one direction, between the back part of the mouth and the pharynx behind; so that, although it yields and permits the food to pass under it in order to enter the pharynx, it prevents the return of that food; and the horse, except in the convulsive spasms of death, breathes and vomits only through the nose. The soft palate in the sheep as well as the ox, not reaching to the tongue, enables these animals to breathe through the mouth, and that which is returned from the stomachs, by vomit or for rumination, passes the same way.

Being carried under the soft palate the food enters the pharynx formed on both sides by powerful muscles, which, stimulated by the contact of the food, close upon it, and urge it on to the entrance into the gullet. There is no peculiarity of structure in these parts in the sheep; nor are these animals subject to diseases belonging exclusively to these organs, and which have been detected and treated, with the exception of inflammation of the pharynx or tonsils, which will be better described when the respiratory system is considered.

Of all domesticated animals the head of the sheep is most easily procured and examined. The agricultural reader would not pass an uninteresting or uninstructive hour in tracing in the head of this animal—sawn asunder vertically—the structure, the relative situation, and admirable uses of the parts which have been described. Let him take up a book, that should be a favourite with him—that is a favourite with every one who reads it carefully—and he will find the following passage:—"There are brought together within the cavity of the mouth, more distinct uses, and parts executing more distinct offices, than can be found lying near to one another or within the same compass in any other portion of the body: teeth of different shape—first for cutting, and secondly for grinding; a pad instead of some of the teeth to perform a most important office as it regards the stomach; fountains of saliva springing up in different parts of the cavity for the moistening of the food, while the mastication is going on; glands to feed these fountains; muscles to guide the prepared aliment into its passage towards the stomach, and, in this animal, to thrust it forward, contrary to the force of gravity. In the meanwhile another and totally different business is going on within the same cavity—that of respiration and voice. A passage is opened for the admission of air, exclusive of every other substance: there are muscles in the tongue, and muscles in the larynx, to modulate the air in its passage; and, in the mouth of the human being at least, with a variety, compass, and precision of which no other musical instrument is capable: and all this is in a single cavity. It is one machine—its parts neither crowded nor confused, and each unembarrassed by the rest *."

The head of the sheep is now quitted, and the passage of the food is traced down

THE NECK.

The form of the neck ought to be closely studied by the sheep-breeder,

* Brougham and Bell's Paley, vol. I. p. 169.

for it is one of "*the points*" of the sheep. It is true that, in order to support the weight of the head, the muscles are large and strong compared with those in the human being; and, if the legs are long, the neck also must be lengthened, in order that the head may reach the ground. The necessity of extraordinary bulk of muscle about the neck is, however, obviated by the employment of an elastic ligament, commencing at the back of the head, attached to every bone of the neck, and continued down to the spinous processes of the back, and inserted there; and by means of which so much of the weight of the head is taken from the muscles of the neck, that they have little more to do than to turn the head from side to side, and move it, within a very limited range, upward and downward. (See fig. 1 in the trunk, p. 109.)

This then being the case with regard to the weight of the head, and the legs having been considerably shortened by careful attention to this object in breeding, the large, thick, long neck of the old sheep is no more to be seen; but one, most certainly full and broad at its base, as being then necessarily accompanied by a round, capacious chest, in which the heart has full room to beat, and the lungs to heave, and gradually tapering towards the head, and being particularly fine at the junction of the head and neck. It also, in well-formed animals, seems to project straight from the chest, so that there is, with the slightest possible deviation, one continued horizontal line from the rump to the poll. The advocates for a thick and a thin neck, are both right to a certain degree. It should be thick towards the shoulder and chest, in order to obtain thickness of chine and capacity of chest—it should be light towards the head in order to avoid that coarseness of form which is altogether inconsistent with kindly disposition to fatten. The drooping neck—the ewe-neck—is rarely or never connected with the quick accumulation of outward fat; it is usually an indication of weakness of condition, and, although not the first, is one of the most unerring proofs of deterioration.

THE ŒSOPHAGUS, OR GULLET.

The food, prepared by the second mastication, passes through the pharynx. It is prevented from entering the wind-pipe, partly by the epiglottis, which, placed at the anterior part of the glottis or opening into the wind-pipe, bends under the pressure of the pellet of food upon it, and covers the glottis, but more from the mechanical closure of the opening, by the influence of its muscles.

The œsophagus is a membranous tube, extending from the pharynx to the rumen or first stomach, and conveying food to it: and also, by means of a canal, which must be considered as a continuation of it, carrying the food on to the third stomach, and through it, to the fourth, or true stomach, according to the state of the food, or perhaps the will of the animal, or both conjointly. It consists of three coats, the external one composed of a loose cellular substance, and acting merely as a tunic and a defence. The second coat being red and muscular, and like that of the ox, composed of two layers, very thick and strong considering the size of the tube. The muscles of each layer wind round the gullet in a spiral direction, but in contrary ways; enabling them more readily to expand, when, in the greedy way in which the food is first swallowed, a large pellet or some hard substance is admitted into it, and afterwards to contract upon it with considerable force and urge it forward to its place of destination. The internal coat is composed of a strong cuticular, polished, but not very elastic substance. In the empty state of the gullet this coat lies in numerous longitudinal folds, which

enable it to dilate when the food passes, or when any large substance, as a piece of turnip, a potato, &c., enters the gullet. Between these two coats, and embedded among the cellular tissue which connects them together, are numerous minute glands, that pour a mucous secretion on the inner coat in order to facilitate the passage of the food.

The gullet takes its course down the neck on the left side of the wind-pipe. It enters the chest in company with the wind-pipe; but soon afterwards leaves that vessel, and takes a higher direction through the chest, below and a little to the right of the posterior aorta. At length it reaches the diaphragm, which it penetrates under its appendices, or crura; and then, bending downwards, and the muscular coat considerably thickening, and the whole tube assuming a funnel-like form, it terminates in, and forms the roof of the canal common to the three first stomachs.

OBSTRUCTION IN THE GULLET.

Occasionally, but not so often as in cattle, portions of food too large readily to descend the gullet, are attempted to be swallowed, and the animal is in danger of suffocation from the pressure of the substance on the wind-pipe. The sheep is much more readily manageable than the cow. Every sheep-master who uses turnips as an article of food for his flock, should have a small leathern probang with a cane stilett. The sheep in whose gullet there is any obstruction should be placed on its haunches, with its shoulders firmly held between the knees of the shepherd. Then, almost without assistance, or very readily by the aid of an assistant, he can pass the probang with its stilett into the gullet, and, with equable, and sometimes firm pressure, force the obstructing body along. If he cannot readily effect this, he should not have recourse to much violence, but pour a little oil into the throat, and then, pressing on the gullet immediately below the obstruction, by gentle or firm manipulation, endeavour to cause its return. If he is foiled in this attempt, he must never have recourse to brutal violence. He may, by main strength, force the potato or the turnip into the rumen, but he will probably lacerate the gullet, or induce a degree of inflammation that must be fatal. Let him clip the wool from the part, and all round the neck; and then, with a scalpel cut down upon the seat of obstruction, and take out the impacted body. Two or three stitches should then be passed through the œsophagus, the edges of the wound in it being brought neatly together. The same must be done with the external skin, the ends of the threads which closed the œsophagus being brought through the outer wound. The neck should then be bandaged, but not too tightly; and the wool above and below will keep the bandage firm. The sheep must be kept on gruel or mashes for a few days, or until the wound is closed; the stitches being removed as soon as the edges of the wound plainly adhere. This is the most simple of all operations, and will rarely be productive of any unpleasant consequences: the probang, however, should always be first and fairly tried.

A case has occurred in the practice of the author, and a similar one is recorded in a French periodical *, of tumour in the gullet obstructing the passage of the food. A sheep was observed frequently to vomit a small portion of food that evidently had not undergone the process of rumination; and, being more attentively watched when it was quiet in the fold, the return of the pellet for rumination was seen to be attended by repeated convulsive action, and evident pain. After the pellet had undergone the

* Recueil de Med. Vet. 1828, p. 229.

second mastication it was swallowed more easily, yet with considerable effort. It may be readily supposed that the suspicions of the practitioners were directed to the œsophagus. At the lower part of it, and where it enters the thorax, there was a hard tumour, as large as a bantam's egg. No time was wasted in attempting to disperse it, but it was at once removed by the knife. It proved to be of a schirrous nature, and was enclosed between the muscular and mucous coats. In less than a fortnight in each case the wound had healed, and the animal ate as readily and throve as well as any of its companions.

THE PROPER FORM OF THE CHEST AND BELLY.

This will be a convenient place to consider the most profitable form of the chest and the belly, through the former of which, containing the heart and the lungs, the gullet passes in order to reach the latter, in which the stomachs and other organs of digestion are found. The bony walls of the chest consist of the dorsal portion of the spine above; composed of 13 vertebræ, or bones of the back—(See a cut of the skeleton at p. 109)—the horse has 18. The latter requires length of carcase for the insertion of more powerful muscles, on the action of which his speed depends.

From each of these vertebræ arises an upright bone, likewise for the insertion of muscles connected with progression, and also for the ligament extending from the poll along the back, and by means of which the head is supported. (See fig. 1. *Trunk.*) The head of the sheep is proportionally less bulky than that of the horse, and it is not often that great and continued speed is required of him. Therefore, if this part of the skeleton of the sheep is compared with that of the horse—(See the Treatise on the Horse, p. 63)—it will be seen that, while there is a considerable elevation of the withers in the horse, and which is accounted a valuable point in him, there is scarcely any in the sheep; and it would be reckoned a bad point in him, because it would indicate largeness and weight of head, and accumulation of flesh in the least valuable part of the carcase, and would be invariably accompanied by a narrow chest, incompatible with disposition to fatten readily. Therefore it is a principle, slow in being acknowledged when the Leicesters were beginning to struggle with the old breeds, that the back should be, as nearly as possible, straight from the rump to the neck, or, rather, from the rump to the poll. The upright bony processes at this part are short, thick, and irregular on their surface, in order to give firm attachment to such muscles as are requisite, and thus compensate for their deficiency in length.

The ribs are also thirteen in number on each side; and the slightest inspection of a well-formed sheep will show how much more horizontally they spring from the spine than do those of the horse, or even of the ox: and, consequently, the greater roundness and capacity of the chest. On the roundness and capacity of the chest depend the size and the power of the important organs which it contains—the heart and the lungs: and in proportion to their size is the power of converting food into nourishment. "An animal with large lungs is capable of converting a given quantity of food into more nourishment, and, therefore, has a greater aptitude to fatten*." On this account the horizontal projection of the ribs from the spine, the consequent roundness, and greater capacity of the chest, are reckoned among the most important points of the sheep. In order to complete the rotundity of the chest, and, with that, its greatest possible capacity, the breast-

* Cline on the Breeding and Form of Animals, p. 4.

bone (fig. 14, p. 109) is not narrow and deep, as in the horse, but of considerable breadth. In the young animal it is composed of seven distinct portions, united by cartilage; but as the sheep advances to maturity the cartilage disappears, and the sternum is made up of one continued bone. This width of the floor of the chest accounts for the fore-legs of the well-formed sheep standing so far apart from each other.

From the front of the sternum is a projection not seen in the horse, or rather occupying the situation of the prominent convexity, *the carinifórm cartilage* in the horse. It is partly cartilaginous, but more muscular and cellular and fatty; extending between the fore-legs of the animal in a horizontal direction, and termed *the brisket*. It is justly reckoned a very important point in the sheep, although it is never proportionally so much developed as in the ox; for the animal that will accumulate much flesh and fat about the brisket, will not be deficient in other parts. There is a joint between the brisket and the proper breast-bone, which permits a lateral motion to the right or the left, and allows the free progression of the animal notwithstanding the protrusion of the sternum.

The horizontal projection of the ribs from the spine secures a certain capacity of chest; but there is another point to be taken into consideration, namely, depth as well as width of barrel. It is true that a deep chest is not capacious unless it is proportionally broad; but when we have the superior projection of the ribs, and the inferior width of the breast-bone, nothing more is necessary to form a chest most favourable to the speedy acquirement of condition, than tolerable depth of carcase. What was the cause of the disinclination to fatten—the almost impossibility of fattening until they were of a considerable age, in the old breeds, but partly the diminished projection of the ribs above, and, more than this, the apparent length of the legs, or in other words, the want of depth in the carcase—the want of room for the organs to propel and to animalize sufficient blood to secure the rapid growth of the animal.

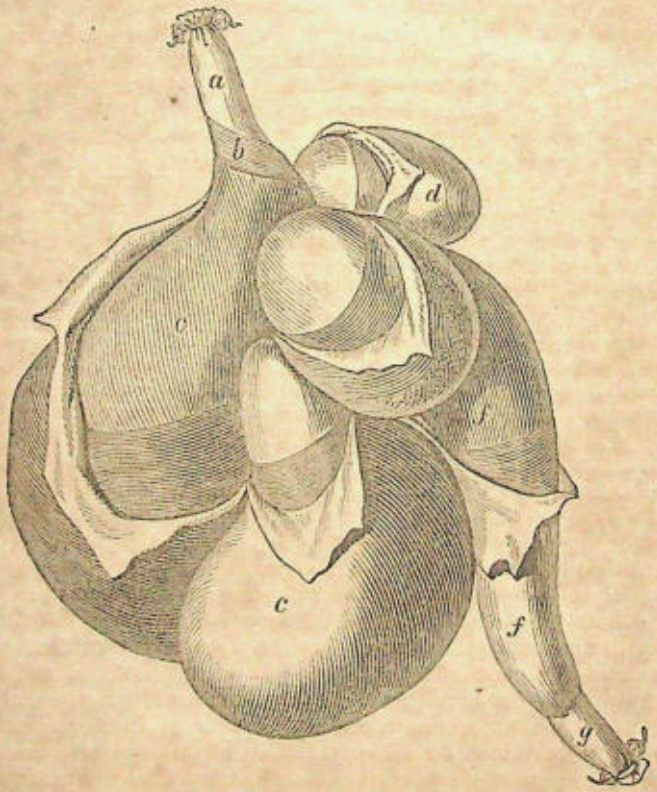
The stomachs and intestines are found more posteriorly. The stomachs are exceedingly bulky in the sheep, and they too must have room to discharge their function. Nature has made provision for this, for the loins of the sheep—the transverse processes of the lumbar vertebræ—are proportionally much wider than in the horse, and somewhat wider than in the ox. This secures plenty of space in the roof of the abdominal cavity at the anterior and central part. The evident projection of the hip-bones, while it gives room for the development of the fœtus, and secures the fulness of the hind quarters—the most valuable part of the sheep—likewise contributes to the capacity of the belly in that direction. The springing of the posterior ribs gives roundness to the sides, and the appendix to the breast-bone, prolonged behind, and the thickness and power of the abdominal muscles give strength to, and preserve the natural form of, the floor of the belly.

Next in importance to the continued straight line of the back and chest, and the roundness of the sides, and the filling out at the flanks is the level line of the belly below. A pot or tub-belly may seem to give somewhat more room, but indicates weakness of the muscles of the abdomen, and an inability to afford its contents that support and pressure which are necessary for the proper discharge of the degestive functions; and, worse than all, a tendency to increase of offal at the expense of the more valuable parts.

The gullet having passed through the chest, and pierced the diaphragm, forms the roof of a canal common to the three first stomachs. The construction of the stomachs of our domestic ruminants is so alike in them all,

that it might be sufficient to refer the reader to the account of those of the ox, given in the volume on cattle, p. 422; but, in order to make the treatise on sheep perfect in itself, it will be necessary to give a very concise description of these organs in him.

THE STOMACHS OF THE SHEEP.



The above cut shows the external appearance of the stomachs, the form of each, and their connexion with each other.

a The œsophagus, after it has passed the diaphragm, and is approaching the stomachs, and the funnel shape of the termination of it, the external coat being stripped off. When thus viewed it appears to terminate in the rumen or paunch.

b A portion of the external layer of the spiral muscles. They are crossed below by another layer, running in a contrary direction. By the united action of the two the food is forced down the gullet after either of the mastications; or returned for the second. The fibres are thickest and strongest at the termination of the tube.

c c Represent the two divisions of the paunch, or first and largest stomach; and, the external or peritoneal coat being dissected off, the two layers of muscles that surround it are brought into view. They cross each other at nearly right angles—they are very powerful, and by their united action the food is carried through the different compartments of the stomach, and every portion of it exposed in its turn to the influence of the moisture contained in, or secreted by, the stomach.

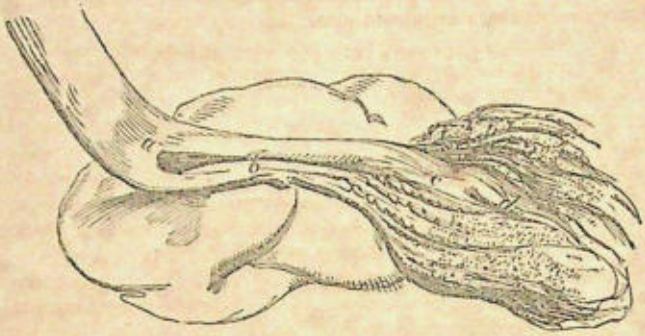
d Represents the situation and form of the reticulum, or honeycomb, with its two layers of muscles.

e Is the maniplus, or manyfolds, with its double muscular apparatus, for the purpose of triturating the hard portions of the food which may have escaped the second mastication.

f Is the fourth stomach, or abomasum, also with its layers of muscles. The food, having been sufficiently comminuted is here converted into chyme.

g Is the commencement of the duodenum, or first intestine.

The following cut is necessary for the right understanding of the manner in which the food is received into, and expelled from, the paunch:—



a Is the termination of the gullet slit open.

b The œsophagean canal into which it opens, also slit open at the roof and turned back. The floor of it is composed of two muscular pillars lying alongside of each other. When they are distended they are in so close approximation that pultaceous food or fluids will pass along it; when they are relaxed they will yield to the pressure of the food, whether solid or fluid, and it will fall through into the rumen, or paunch, which lies underneath. The second stomach, or reticulum, is also underneath, and a little on one side of this curiously-constructed floor; and pellets of food can, in a relaxed state of the pillars, be forced up into the canal, in order to be reconveyed to the mouth, through the œsophagus to undergo a second mastication.

c Represents the floor of the maniplus, the roof of that stomach being opened, and turned on either side; and at

d Is the opening into the fourth, or true stomach.

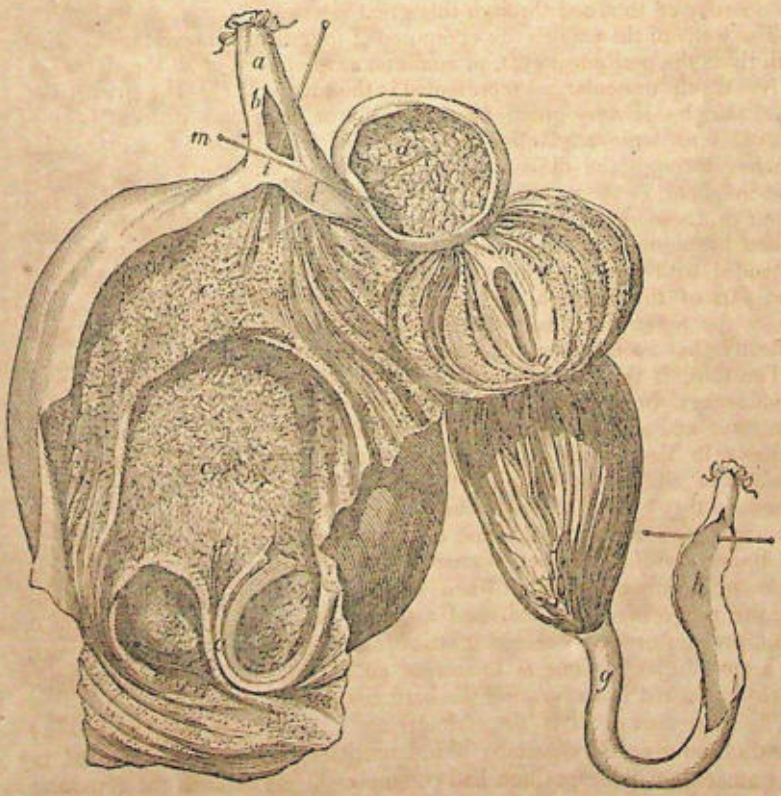
It will easily, therefore, be seen that, according to circumstances, or at the will of the animal, the food, or at least certain portions of it, may be received into the rumen, or carried on through the œsophagean canal into the fourth stomach. The manner in which it descends the gullet is the circumstance which most influences the one or the other. Solid food, grasped and urged on by the spiral muscles of the gullet, will descend with considerable force on the curiously-constructed floor of the canal, and break through it, separating the pillars (*b*), and fall at once into the paunch. This is the case with the food when it is first gathered. After it has been returned for re-mastication, and thoroughly impregnated with the saliva of the mouth, and reduced to a pultaceous mass, it, to a considerable degree, eludes the grasp of the œsophagean muscles, and slips gently down the gullet, and over the base of the canal (*c*), and finds its way into the fourth stomach (*d*). Fluids, in whatever way they are taken or given, can be little acted upon by the muscles of the gullet,—this tube cannot grasp them or contract upon them; yet the manner in which they are administered may have great influence. If the animal forcibly gulps them down, or if they are given hastily and bodily by the medical attendant, they will fall on the canal at the base of the gullet (*b*) with considerable momentum, and force asunder the pillars, and enter the rumen; if they are drunk more slowly, or administered gently, they will trickle down the throat and glide over these pillars, and pass on through the maniplus to the true stomach.

This explains some puzzling and perplexing circumstances in the medical treatment of ruminants of all kinds. Let it be supposed that these animals are labouring under some disease that evidently requires the administration of aperient medicine. It is usually poured into the mouth, as quickly as possible, from a somewhat broad-mouthed vessel, but it has no effect.

Dose after dose is administered, but the bowels are not moved. The medical attendant wonders at this strange state of things, and at length gives some kill-or-cure drastic purgative, under the power of which the animal dies. The murdered patient is probably examined after death—for few of the blunders of the veterinary surgeon remain unexposed—and almost the whole of the medicine is found in the paunch. There was no possibility of its acting on the bowels, for it had not entered them.

Ruminants often labour under actual constipation of the bowels; there are cases in which the maniplus is choked with indurated food, and the intestines have lost their power of propelling their contents: but the far greater number of instances of supposed constipation are attributable to the thoughtless and unscientific mode of administering the medicines, and not to any inertness in the bowels, or want of power in the drugs. If the assistant stands astride over the sheep, and holds the head firmly between his knees, the medicine may, in the majority of cases, be administered slowly and gently, and with the certainty of its reaching its intended destination, instead of entering into, and remaining useless, or worse than useless, in the paunch. There are very few things in the treatment of our ruminating patients that deserve more attention than the method of administering the required medicines. The opinions of practitioners would undergo material change with regard to the efficacy of many drugs, and the doses in which they should be employed, were sufficient care bestowed on the mode in which they are given.

THE RUMEN.



The pellet of food has passed down the gullet (*a*), and from its weight, and the impulse it acquires from the action of the muscles of that tube, it comes with a certain momentum on the floor of the œsophagean canal, forces asunder the pillars, and enters the rumen.

This first stomach (c c., p. 422 and 424) is of immense size compared with the animal to which it belongs, and occupies nearly three-fourths of the abdominal cavity. It is attached by its superior surface to the membrane covering the muscles and the vertebræ of the loins: its vessels and nerves form part of this attachment and support, but a portion of the mesentery is chiefly employed in securing it in its situation. On its right side it is covered by some of the small intestines—on its left it is in contact with the flank, and, therefore, is readily punctured in cases of hoove. Inferiorly it rests on the floor of the belly, its left side reaching from the diaphragm to the pelvis—its right not extending so far backward. It is attached to the diaphragm by the œsophagus, and by a peculiar ligament—the posterior part of the right division floats free in the belly, and, in the unimpregnated animal, occupies a portion of the pelvis.

The rumen is divided into two unequal compartments, placed somewhat obliquely, and one anterior and superior to the other: the last, when the function of the rumen is considered, will be found to be the most important distinction between the two sacs. This relative position is plainly seen in the last cut. The bands or duplicatures of the coats, by which these divisions are effected, are very thick and strong. Each of these sacs is subdivided into smaller partitions, by the same interposition and duplicature of the coats of the stomach. The intention of these compartments is to retard the journey of the food through this great viscus.

The walls of the paunch are composed of four distinct membranes. Exteriorly is the peritoneal coat, or common envelopment of all the viscera.

Next is the muscular, as represented in the cut (p. 422). The strength of these muscles is very great, as may easily be imagined when it is considered how large a quantity and weight of food is made to perform its journey through the different compartments of this enormous reservoir. The shepherd, or the veterinary surgeon, often has a practical proof of the power of these muscles, and of the direction in which they are acting. When he plunges his trocar into the flank of a sheep whose paunch is distended with gas, it seems to be immediately seized by the muscles of that part of the stomach and carried forcibly forward. Presently this ceases for a few seconds. Then the action is resumed, and it is with difficulty that he can keep his hold of the trocar.

The third is the glandular coat. It is composed of innumerable small prominences, or papillæ, scattered over every part of the rumen, more thinly set and smaller about the longitudinal bands or duplicatures; increasing in size towards the centre of the different compartments; and, thickest of all, at the bottom of each division. When they are closely examined they appear to be inclined in the direction taken by the food, bending backwards along the base of the paunch, and inclining forward in the upper divisions of that stomach. They, at the same time, are capable of becoming erectile when occasion requires, and thus retarding the progress of the food, and assisting in triturating and rubbing it down, preparatory to its second mastication. This is one of its functions, but a more important one is to secrete an alkaline and penetrating fluid, which may assist in macerating the hard contents of the rumen.

The inner coat of all is the cuticular one. It is very thin, and easily peeled off after death, especially if inflammation had previously existed in the stomach, or decomposition had commenced. It defends the glandular

apparatus beneath from any occasional injury that might result from the hard food which the rumen often contains, and so well is this duty discharged, that the interior of the rumen is perfectly insensible. The most caustic and corroding substance may be applied to it; nay, this coat may be pricked, or scratched, or cut, and the animal will not betray the least indication of pain.

THE RETICULUM, OR HONEY-COMB.

This stomach lies under and a little on one side of the division between the pillars in the floor of the œsophagean canal (*b*, p. 422); the interior of it is seen at *d*, p. 424. When viewed externally (*d*, p. 422) it is found on the abdominal prolongation of the sternum, and lying against the diaphragm, in front of the left sac of the rumen. It is a little curved upon itself from below upwards, and is the smallest of all the stomachs. It is composed of the same four coats as the rumen; but the muscular coat is, compared with the size of the stomach, much stronger than in the rumen; the glandular coat assumes a different species of irregularity, its elevations being in the form of the cells of a honey-comb, but much shallower; and on the floor of each cell are smaller walls, surrounding numerous minute papillæ, which are evidently secreting glands. The inner coat of this stomach also is cuticular and insensible.

THE PROCESS OF RUMINATION.

The food, hastily gathered, as has been already described, descends the gullet, and breaks through the floor of the canal at its base. The greater portion of it enters the rumen, but a small quantity is received by the reticulum. It finds in the paunch a certain quantity of fluid—the usual drink of the animal, mixed with an abundant secretion from the glandular coat. It is in consequence of this secretion that ruminating animals can subsist so much longer than others without water. Sheep on tolerably succulent pasture will not require any water; and they have been kept on dry food for a considerable period without apparent injury or inconvenience. On the other hand, if the herbage is too moist, or the food of a watery nature, the sheep are subject to rot and dropsy, and various other diseases connected with weakness of the digestive organs. In this fluid the food undergoes a process of maceration, or softening, to the efficacy and speedy accomplishment of which the alkaline secretion of the stomach very much contributes. Almost all alkalies are powerful solvents of vegetable substances.

While the food is thus macerating, it is constantly agitated by the action of the muscles of the stomach. That which lies in the anterior, and lower part of the paunch, immediately under the opening into the rumen, is carried or propelled backwards: having arrived at the posterior end of the sac, it is forced upwards; and then becoming the superior surface, is carried forward, by the action of the muscles of the roof; and so it makes a circuit of the rumen, delayed for awhile in each of the compartments, or cells, in order that it may be saturated with the fluid, and fully acted upon by it. It will likewise be felt by him who may have occasion to paunch or insert a trocar into the rumen of a sheep labouring under hoove, that this action of the muscles of the stomach is not uniform and constant, but that it proceeds by starts, and strong pulsations, by which means the food is agitated and separated, as it is carried on, and the fluid is brought into contact with, and acts upon, every part of it.

This journey occupies, or, perhaps, repeated journeys occupy a considerable time. It appears from some interesting experiments by Spallanzani and Tiedemann, that no portion of the food is returned for rumination in

less than fourteen hours; that the average period is sixteen or eighteen hours, and that peculiarly hard and fibrous food has been detained thirty hours. It is true that the sheep often begins to ruminate as soon as it ceases to feed; but it is not the food which has just been swallowed that is returned, but that which has been its full time macerating in the reservoir. If the reader will examine the inside of the rumen, as delineated in page 424, figure *c*, he will observe that the food which in successive pellets is urged on to the œsophagean canal, must be supported by other portions beneath. None of it could be thrown over the valve, which is there plainly seen, unless the lower division of the stomach was filled to that height. It will follow from this that the stomach of the sheep is always half full at least. Sheep have been buried in the snow many days, and at length perished by hunger; yet, when opened, the paunch contained a considerable quantity of food. The stomach of the horse or the dog is soon emptied if food is withheld; the paunch of the sheep is always half filled.

DISTENSION OF THE RUMEN WITH FOOD.

It occasionally happens, when an animal is brought without preparation from poor to rich pasture, that he will over-fill the paunch. This is particularly the case when sheep are put and left on turnips. It is easily distinguishable from distension of the rumen by gas. The oppression of the animal is greater—the belly is not so much distended, and the flanks have not an elastic rebound, in fact, they do not yield to pressure. This is a serious case, and requires mechanical, and not medical assistance. If the probang, passed down the gullet, and into the paunch, indicates that that viscus is completely filled, the animal should be bled, in order somewhat to relax the spasmodic pressure of the stomach on its contents; for, until its vital power is exhausted, just in proportion to its distension will be the reaction of its muscular coat. A dose of physic should then be administered,—four or six ounces of Epsom salts—in order, if possible, to excite the paunch to sympathetic action, and dispose it to eject a portion of its contents into the œsophagean canal, a circumstance that does occasionally take place. More dependence, however, will be placed on the use of Read's stomach-pump, by means of which warm water may be injected into the rumen, the hardened contents of that viscus softened, and a portion of the accumulated food expelled by vomiting, or forced through the third and fourth stomachs into the intestines, without previous rumination.

There is yet a last resource which the insensibility of the stomach admits of, and which should not be delayed too long, namely, an incision into the paunch at the left flank, and the mechanical removal of its contents. There is comparatively little danger attending the operation, except that which arises from the escape of some of the contents of the rumen into the abdominal cavity; and which would cause considerable and perhaps fatal irritation and disease, although possibly at a distant period, and the cause of it unsuspected. This, however, may be easily prevented, by bringing together the edges of the incision into the rumen and the flank, and passing a few stitches through them. A portion or the whole of the contents of the paunch may now be removed. If decomposition has commenced, the whole should be taken away; but if there is no offensive smell, or extrication of gas, it will perhaps be better, remembering the quantity which naturally remains after each rumination, to extract not more than two-thirds of the mass.

The edges of the wounds should now be brought together, and retained by sutures, each one including both the rumen and the skin—a pledget of tow should be placed upon the part, and this covered by dressings of emol-

lient healing ointment—the whole being confined by a proper bandage. The wound will usually be completely healed in two or three weeks.

It should, however, be remembered that the stomach having been distended to this extraordinary degree, will not soon, or, in some cases, will never perfectly recover its former tone. The animal will be subject to occasional hoove; and at all events, for many a week, will not thrive so well as his companions. To this may be added, that the simple distension of the paunch by too much food, is not, at first, necessarily accompanied by sufficient inflammation to affect and deteriorate the character of the meat; and that it is a matter of consideration for the owner, whether it might not be most advisable to destroy the animal at once, if not for the butcher, at least for home consumption.

HOOVE, OR DISTENSION OF THE STOMACH BY GAS.

If succulent vegetable matters are long exposed to the united influence of warmth and moisture, fermentation and decomposition ensue, attended by the extrication of a considerable quantity of gas, in which carburetted hydrogen is the prevailing principle. There are some admirable provisions made by nature against the frequent or dangerous occurrence of this in the paunch of the sheep. Allusion has been made to one in the early part of this treatise. It has been stated that an elastic pad occupies the place of teeth in the upper jaw, and that it is by a half biting and half tearing action that the sheep gathers his food. The necessary consequence of this is, that some of the grass is torn up by the roots, and a portion of the mould adhering to them is swallowed; and, all our soils containing more or less absorbent or calcareous earth, the acid which is the early product of this decomposition, and necessary to its progress, is neutralized, or removed almost as rapidly as it is formed.

A very considerable quantity of fluid is necessary for the maceration of the contents of the stomach. This is partly supplied by the liquid which the animal drinks, but fully as much by a secretion from the numerous glands concealed under the papillæ, with which the coat of the stomach is covered. This secretion is of an alkaline nature, as is very pleasingly shown by a test which every farmer has at his command. Let boiling water be poured on the fresh leaves of red-cabbage, and the clear fluid will be of a bright blue colour. Let other water, also hot, be poured on some pieces of the paunch stripped of its cuticular coat; let it be suffered to remain until it is cold, and then filtered: if it is now mixed with the former, the blue colour will receive a faint but very evident hue of green. It is the property of alkalis to turn vegetable blues to a green colour.

This alkali serves a double purpose: it assists in the maceration of the food, for it is a very powerful solvent of vegetable matter; and it combines with and neutralizes the acetic principle which is developed in all these decompositions: therefore in a state of health, although the food is always macerating, the putrefactive fermentation is never suffered to go on. The health of the animal may, nevertheless, be occasionally deranged; the peristaltic motion of the stomach may be retarded, or almost suspended—the natural secretion of the paunch may be vitiated—it may be changed from an alkali to an acid, and the fermentation and decomposition of the food may be carried to an annoying or fatal extent: therefore it is that distension of the paunch with gas is, to a greater or less extent, the companion or the result of almost every disease to which the sheep is subject. It is the effect and not the cause of many a malady, and so it must be considered and treated. When the paunch regains its power of propelling

the food, or the secretion of the glandular coat is established in its due quantity and healthy character—when other diseases, with which the stomach sympathizes, and by which it is deranged are removed, the flanks will subside, and the undue extrication of gas will cease.

There are, however, certain kinds of food more disposed than others to this fermentation, and of which the sheep are particularly fond. Turnips, clover, and fresh-eddish, are fruitful sources of hoove, when the sheep are incautiously turned on them, or suffered to remain on them too long. The superior quantity of nutritive matter which they contain, as well as the superabundant juices with which they abound, require that they should at first be taken in small quantities, and rapidly hurried through the stomach: but after a little while the paunch and the constitution of the animal will become accustomed to them—their dangerous properties cease to have effect, and the flock thrives rapidly upon them. When the sheep have been taken from poorer and drier pasture, and turned suddenly upon this more nutritious and succulent one, and gorge themselves with it as much as they please, the muscular power of the paunch is insufficient to propel the additional mass of food through its compartments with the ordinary rapidity. The food disposed to the earliest fermentation is now the longest delayed, and the stomach is distended with the extricated gas. This is sufficiently indicated by the enlargement of the whole belly, and particularly of the flanks, and the left flank most of all, and which rebounds against the pressure of the hand, and hollowly reverberates when slightly tapped upon. The distended paunch presses against the diaphragm, and the breathing becomes laborious—the blood is no longer able to circulate through the vessels of the paunch, and it is determined to the head; and unwillingness to move, and a kind of stupor or half-unconsciousness rapidly supervene. The swelling and hollow sound of the flank, the difficulty of breathing, and the disinclination to move, will sufficiently indicate the nature of the complaint, and relief must be quickly afforded or the animal will perish. In a very early stage of hoove, exercise, the driving of the flock gently about for a quarter or half an hour, may, by the occasional displacement of the pillars of the œsophagean canal, as the animal trots along, permit the escape of a considerable portion of the gas, and thus afford temporary or even permanent relief; but he would act brutally as well as injudiciously who would send his dog among the sheep and put them to the top of their speed. With regard to some he might succeed in expelling the gas; but there would be hazard of occasionally rupturing the paunch, and destroying the animal.

The shepherd has recourse to the use of his knife in these cases: he plunges it into the left flank, a little below the chine, and half way between the haunch and the ribs. The gas will rush violently out; the patient will be evidently relieved, and often the immediate inconvenience and danger from the distension of the stomach will entirely cease. The shepherd, however, is not aware of the constant vermiform motion of the stomach which has been described, and the impossibility of the wound through the skin, and that into the stomach, continuing to coincide, and especially when a portion of the air has escaped, and the inflated paunch begins to subside. During a considerable time some gas will continue to escape from the paunch, and, with it, portions of the more solid contents; but they will not all pass through the external opening—they will fall into the cavity of the belly, and there they will remain an unsuspected source of irritation, and, sooner or later, of serious and fatal disease. The sheep is apparently cured for a time, and the shepherd prides himself on the dexterity and success

with which he has operated, but the animal does not always thrive well afterwards, and sometimes he wastes away and dies. It is in consequence of this method of paunching, that the opinion, too well founded in fact, has obtained, that the sheep that has once been hoven does not afterwards improve so rapidly as the others. It is said that his over-distended stomach has been weakened, and cannot afterwards perfectly contract upon and dispose of its contents. This is certainly true; but the grand source of the after-unthriftiness and disease of the sheep is the presence of portions of food in the cavity of the abdomen,—a slow-working, but a powerful source of evil.

The shepherd should always be supplied with a small trocar, and, if with one or two spare canulas, so much the better. They may be plunged into the flank just as readily as the knife, and the canula may be retained in its situation by means of a string passed round the animal, or, at least, may be held there by the operator until the gas has all escaped. No portion either of gas or food can then find its way into the belly, and the sheep thus relieved, if the operation has not been too long protracted, will rarely be subject to after indigestion or disease. The rumen suffers very little from the wounds thus inflicted. The author once had occasion to puncture a sheep seven times in the space of four days. It was sent to the butcher two months afterwards. There was not a vestige of disease in the whole of the abdomen, and it was with considerable difficulty that any trace of the wounds in the rumen could be discovered.

Dr. Munro invented a hollow tube with a stilett, and a perforated rounded termination. This was thrust down the gullet, and through the floor of the œsophagean canal into the rumen, and the gas with which it was distended immediately rushed out. It is a very useful instrument, and far preferable to the knife. It is sometimes a little difficult to manage, but there is no danger attendant or consequent on its use. The struggling of the patient, in some cases, prevents its being retained in the rumen so long as is necessary for the full extrication of the gas, or the shepherd is tired of forcibly holding it there,—and, on the whole, it must yield to the trocar in easiness of use, and permanent relief.

It not unfrequently happens that, whether the probang or the trocar has been used, the rumen too quickly fills again. It becomes then a consideration of importance whether there are not means of preventing the future extrication of gas, as well as getting rid of that already developed. The chloride of lime was recommended for this purpose in the work on "Cattle;" and the general use of the medicine has fully established its reputation. The gas which is developed in the rumen of sheep, as well as that of cattle, is composed chiefly of hydrogen in union with carbon. There is a very strong affinity between chlorine and hydrogen, and they rapidly combine when brought into contact with each other; therefore if a small quantity of the chloride of lime—a drachm—dissolved in a quarter of a pint of water, is introduced into the paunch of a hoven sheep, either by means of a horn, or what is better, for the course which it will pursue is then more assured, through the canula of the trocar, terminating in a kind of cup for this purpose, the chlorine will leave the lime and unite itself with the hydrogen and muriatic acid—a compound of chlorine and hydrogen will be formed. After this, as if purposely designed that the stomach should suffer no harm, the muriatic acid thus formed will speedily unite itself with the lime liberated from the chlorine, and a harmless compound—muriate of lime—will be the result.

In case of the continued and obstinate extrication of gas after the

repeated insertion of the trocar, the practitioner would probably be justified in making an opening into the paunch through the flank, as recommended in distension of the stomach with food. The same caution, however, must be observed in attaching the wall of the rumen to the substance of the flank.

When, by any of these methods, the sheep has been relieved, the practitioner should endeavour to guard against a return of this gaseous extrication. He should always administer a purgative. From two to four ounces of Epsom salts, with a drachm or two of powdered ginger, will be the best medicine that can be given. He will also not forget how much the destination of the physic, or the stomach into it actually passes, depends on the manner in which the drink is given, and the great probability that, after such distension, and consequent debility, the physic will break through the pillars of the œsophagean canal, and enter into and be lost in the rumen, if it is not very cautiously administered. Attention should also be paid to the pasture on which the animal is afterwards turned, which should be short and bare, rather than luxuriant.

POISONS.

Comparatively few grown-up sheep are lost from the eating of poisonous herbs. Lambs, too early separated from the ewes, either that they or the mothers may become a little sooner ready for the market, are occasionally lost from feeding on deleterious plants. Allusion has already been made to this, and the folly as well as inhumanity of this forcing system pointed out. The lamb deprived of the guidance of its dam will browse on almost every plant that comes in its way, and perish from poison as well as from indigestion; but, otherwise, from the peculiar acuteness of its scent, far superior to that of the horse or the ox, it is seldom that the sheep comes to harm from this cause. The yew, and some of the species of the ranunculus or crow-foot, are the plants by which they most suffer. In general, however, the sheep will feed on many more plants than either the horse or the ox *, and, when most abandoned by man, will suffer less than either of the others from unwholesome and injurious plants.

It is to be feared that little can be done for the relief of these animals when unfortunately they have been eating poisonous vegetables. Warm water may be injected into the paunch by means of Read's apparatus, and pumped out again, and this repeated until either vomiting is excited, or the

* The great Linnæus, assisted by several of his pupils, instituted a course of experiments as to the number of the indigenous plants of Sweden, which different species of cattle would eat or refuse. The plants were all fresh and carefully gathered, and offered to the animals, not when they were kept fasting on purpose that their appetite might be keen, but in the ordinary mode of feeding. Horses ate 262 species, and refused 212: cattle ate 276 species, and refused 218; while sheep took readily 357 species, and refused only 141.—The Veterinarian, 1833, p. 532. A list of these plants may be seen in the second volume of the Amœnitates Academicæ. Of what incalculable advantage, in this point of view alone, would be the institution of experimental farms in Great Britain! There were a great many of these plants that were refused by all the domesticated animals. How readily might the farmer be enabled to rid his pastures of them, and to make room for those that were not only safe, but wholesome! With what advantage might he be enabled to suit his different sorts of cattle to the different pastures, and to make his pastures suitable to the different kinds of cattle that he wished to turn upon them! How rapidly would every kind of green or of dry food be improved, by being rendered more acceptable and nutritive to the cattle, and more profitable to the farmer! Surely the time will arrive when experimental farms will be instituted by some of the leading provincial societies,—if not, as they ought to be, by the Government itself. The education of the farmer and the veterinary-surgeon is capable of much improvement here.

poison has been rendered harmless by dilution. Active purgatives should also be given, and in the cautious way that has been already recommended. After the animal has been well purged, a few doses of gentian and ginger will probably be useful in restoring the tone of the stomach *.

CONCRETIONS IN THE RUMEN.

The sheep is not so domesticated, nor so greedy an animal as the cow; therefore few of the strange substances have been found in its rumen which that of the cow has produced, nor do concretions, whether principally formed of hair, or of layers of vegetable matter, so often exist in it; and, when they have been found, there are few cases in which their presence has been indicated by any previous symptoms, or in which they have been the cause of want of condition or disease.

* An abridgment of a case of poisoning among sheep by the *ranunculus arvensis* or corn-crowfoot, may not be unacceptable or useless to the reader. It is related by M. Brugnone, a French veterinary-surgeon. The corn-crowfoot is one of the first of the flowers that appear in the fields, or among the wheat, and particularly on the fallow-ground in the spring. Its stalk has appeared, and its radical leaves have developed themselves, before scarcely any other plant has germinated. It throws out various branches, and rises to the height of eight or twelve inches. It flowers in May; the seeds are ripe in the beginning of June—they are shed in the course of that month, and the plant then speedily withers away, and can scarcely be detected after the harvest. It has an acrid taste. It was acknowledged to be poisonous; but there was no instance of its having been voluntarily eaten by sheep.

On the 18th of April, 1786, M. Brugnone was sent by the municipal officer to a farm situated on the banks of the Doire, to ascertain the cause of the sudden death of seven sheep, and to prescribe for several others that were then seriously ill.

As soon as he arrived he opened three of the dead sheep, and found in them all dark red patches on the lining membrane of each of the stomachs, and largest and almost black in the fourth stomach, presenting there an appearance of gangrene. The patches also extended a considerable way along the small intestines. With this exception, the viscera of the chest and abdomen were perfectly healthy. The blood in the cavities of the heart was rather more liquid than in its natural state, but it was not in the decomposed and broken-down condition in which it is sometimes seen.

Among the food contained in the stomachs, he found in the first and in the third stomach the broken-down and half-masticated roots of some unknown plant. He went to the field in which the sheep had pastured, and he found it in a manner full of the corn-crowfoot, and a great many of the plants had evidently been browsed upon and eaten down. He compared the roots with those found in the stomachs of the sheep—they were precisely alike; and he had little doubt that the destruction of the animals was attributable to the poisonous agency of this plant. In order to render the matter more sure, he offered a little of the crowfoot to sheep belonging to another flock. They ate it with avidity, and so did some horses and cattle. He gave it cautiously, in order to guard against its possible destructive property. Some other cattle which were accidentally turned into this field, and remained there more than an hour, were scarcely stabled before they were attacked with colic, more or less violent, followed by hoove, and which did not cease until a brisk purging ensued.

More certainly to decide the matter, M. Brugnone made a decoction of some of the roots, and gave three ounces of it to a dog. The animal died in less than four minutes. He put a drop of the expressed juice of the root on his own tongue, and he felt extreme smarting for a long time; he chewed a small portion of the root, and his tongue, and palate, and the back part of his mouth, were so exceedingly painful for an hour that general convulsions of the frame followed. Other botanists had, before this, proved that the leaves and seeds of this ranunculus were poisonous,—it was now ascertained that the whole of the plant was so.

To the sheep that were ill he administered diluted white-wine vinegar, and the effects of the poison gradually subsided: on the following morning they were all comparatively well. The destructive effects of the poison were most rapidly developed, for the sheep had not been more than two hours on that pasture, when three sheep out of the seven died.—Instruct. et Observ. sur les Maladies des Anim. Domest. Tome iii. p. 309.

INFLAMMATION OF THE RUMEN.

This is a circumstance of very rare occurrence. Nature has given to this macerating reservoir an indisposition to be acted upon by circumstances and agents that would do irreparable mischief in almost every other part of the frame. Very slight inflammation is induced even by the large incision that is occasionally made for the purpose of evacuating the contents of the stomach; and although it may be necessary to puncture the rumen of the sheep many successive times, in order to evacuate the gas with which it is distended, no dangerous inflammation, or even apparent inconvenience follows.

The sheep having ceased from eating, and the paunch being so far filled that a portion of the food is level with, or higher than the projection or shelf delineated at *c*, p. 424, it is pushed forward to the upper and anterior part of the rumen by the vermiform motion of that viscus. Having arrived under the œsophagean canal, or *cud-duct*, *b*, p. 422, or *e*, p. 422, a very singular action or motion of the paunch is there taking place. M. Flourens, who examined the rumen in the living sheep, describes it as forcibly rising and contracting, and forming a succession of knots and hollows. In some of these motions, a portion of the food is seized, and separated from that below, and grasped between the lips or pillars of the cud-duct. Stimulated by the presence of this detached portion, and assisted by the pressure of the diaphragm, and the action of the abdominal muscles, the base of the gullet (*a*, p. 422) presses upon this anteriorly, and the closed entrance into the maniplus (*c*, p. 422) posteriorly, and the roof of the cud-duct superiorly, and the pillars of the floor (*b*, p. 423) inferiorly, and it is formed into a kind of pellet; at the same time, the reticulum (*a*, p. 422) is compressed, and the fluid which it secretes is forced out, and surrounds and lubricates the pellet.

Another kind of action then succeeds—the base of the gullet expands; the posterior part of the cud-duct contracts; the pellet is pushed forward along the cud-duct; it is grasped by the funnel-shaped base of the gullet; and by the power of the spiral muscles reconveyed to the mouth in order to undergo a second mastication. This act is performed very leisurely—the animal is usually couched on the ground, supporting himself on the left side; his countenance expresses a sleepy kind of pleasure, and, if undisturbed, he usually falls asleep as soon as the rumination has ceased—or, rather, the rumination is suspended by the gradual approach of sleep.

It has already been seen that the mouth of the sheep is abundantly supplied with salivary glands, and as the returned food is remasticated, the secretion from them mixes plentifully with it, and the mass is reduced to a pultaceous or semifluid state. It then once more passes down the gullet, and enters the cud-duct.

It has no sooner arrived there, than it is again seized by the powerful muscles of which this canal is composed; the base of the gullet closes, and the roof of the duct contracts, but the entrance into the maniplus remains open. The fluid part of the pellet is squeezed out, and passes on into the maniplus; while the portion of food which remains hard and unbroken, falls into the rumen once more to traverse its various compartments, and undergo a farther process of maceration. That this is the fact is evident from an examination of the contents of the paunch. They will be found to consist principally of food more or less macerated, but scarcely bruised by the teeth; with this, however, will be mingled no inconsiderable quantity of that which has evidently been subjected to the action, and in a great measure ground down.

LOSS OF CUD.

Lambs, while they are supported entirely by the milk of the ewe, or by that of a foster-mother, do not ruminate; but this process commences as soon as the animal begins to take any solid food. The milk passes at once into the fourth or true stomach, in the sucking lamb, and the rumen is not at all used, and is small in size compared with the fourth stomach. A month afterwards, if the lamb has been permitted to follow its dam to the pasture, the habit of rumination will have been for a considerable time established, and the rumen will be more than twice as large as the fourth stomach.

The act of rumination is partly a voluntary, and partly an involuntary one. It can be suspended, for awhile at least, during the pleasure of the animal; and, when he chooses, it may be resumed. In a state of health, however, and the paunch having been filled, and its contents sufficiently macerated, he probably cannot easily, or, perhaps, at all resist the disposition to ruminate. There is not a more unerring symptom of disease, either confined to the digestive organs, or pervading the whole frame, than the cessation of rumination, or "the loss of cud," as it is generally called. It is not so often observed in the sheep as in the ox, for the latter is more under the inspection of the owner; but it exists quite as frequently. As soon as it is observed, the sheep should be separated from the flock, and carefully watched and examined. The loss of cud cannot, perhaps, be termed a disease, but it is a symptom of disease, and that either of an inflammatory or debilitating nature. The mode of treatment will depend entirely on the disease that is discovered or suspected. The cause being removed, the effect will cease. It may, however, occasionally happen that the malady is very obscure. Its nature and its seat may be doubtful. Two ounces of Epsom salts, with a drachm of ginger, may, in either case, be administered with great propriety. It cannot do harm, whatever may be the real complaint, and it will often restore the tone of the stomach and of the system.

THE MANIPLUS.

The fluid part of the food, and that which has been sufficiently ground for its nutriment to be extracted, passes through the inlet into this stomach: but the sheep having a double office to perform—namely, to supply us with meat and with raiment—it is necessary that no particle of nutriment which the food contains shall be lost. This is the office of the maniplus, and it is admirably adapted for the performance of it. The pillars composing the œsophagean canal terminate a little before that canal reaches the maniplus, and the pultaceous food passes along it, and enters the maniplus, the floor of which is a continuation of the cud-duct. Hanging from the roof of this stomach, and reaching very nearly to the floor, are many duplicatures of the cuticular coat, very dense and strong, and thickly studded with little prominences of a file-like hardness. Each duplicature or leaf contains within it a layer of powerful muscles. These leaves, running precisely parallel to each other, originate from various parts of the roof of this stomach. They are unequal in length. One leaf hangs down from the top almost to the floor: on either side is a shorter one, and beyond that a shorter still, and outside of these another not half an inch in width. That is the termination of one group, and the commencement of another. The number of these groups varies in different animals; the sheep generally has seven—occasionally eight—each group consisting of six leaves of different lengths.

The central leaf in each of these groups hangs over the continuation of the œsophagean canal—and the food in its way to the fourth stomach must necessarily pass between them. The muscles which they contain are in constant and powerful action, and the leaves are continually moving upwards and downwards. Some portion, and probably the greater part, of the food is grasped, as it were, between the leaves, and raised, and delivered over to the smaller ones immediately above, and by them to others still higher; and the work which they accomplish is sufficiently plain. In the first place, they squeeze out all the fluid which the mass, reduced to a pulpy state, contains; and this, which constitutes the greater part of the mass, runs along the floor, and is conveyed onwards into the fourth stomach. The other, and harder portion, is detained between the leaves; and it is easy to see, on examination of one of these stomachs, the different layers of which the residuum is composed, showing the successive graspings of the leaves. This probably is the office of the stomach during the process of rumination, and that process is probably terminated by the paunch being drained of food to the level of the valve (*c*, p. 424), or the leaves of the maniplus, containing between them as much drained and imperfectly masticated food as the stomach will hold: or, rumination may cease from the united action of both these causes. After this, while the sheep is taking his rest, or replenishing the first stomach, the action of the leaves of the maniplus continues; and, covered as they are with hard papillæ, almost like the teeth of a file, it is easy to conceive that they have sufficient power to rub down that portion of the food which, although not previously reduced to a state of pulp, had been considerably macerated and softened. The quantity of food contained in the maniplus of the slaughtered sheep is well known to be exceedingly variable, and probably depending in a great measure on the time that had elapsed since the last rumination, as well as on causes which may impede or retard the grinding action of this stomach. Possibly, in their examination of the sheep after death, veterinary-surgeons have not always paid sufficient attention to this, and have formed somewhat erroneous opinions of the disease of the animal and the cause of death. For some time after rumination has ceased, the maniplus will be found perfectly filled, and its contents somewhat hard; and this must not hastily be attributed, as it often has been, to constipation. The stomach is in that state in which it was naturally left when the animal ceased to eat, and before it had time to dispose of its contents.

DISEASES OF THE MANIPLUS.

The maniplus acts a most important part in the preparation of the food for digestion in the true stomach; and it is easy to imagine that it may be frequently interrupted in the discharge of its double duty. Let it be supposed that a sheep has eaten of a certain quantity of unusually stimulating and acrid, or poisonous food. It has been macerated in the rumen—it has undergone the second grinding of the teeth—and it descends the gullet, and passes along the cud-duct, and enters the floor of the maniplus; and there it is seized by the leaves of that stomach, eagerly searching, as it were, for their prey, and grasping it closely. The stimulating or acrid property of the food soon begins to produce its natural effect on the stomach by which it is compressed; and that compression is increased tenfold; it becomes spasmodic, and every drop of fluid is squeezed from it. But the powers of this stomach, as well as of every other part of the frame, must be speedily exhausted by over-action; and when its second function, the trituration, or rubbing down of the dry residuum should commence, it is unable to con-

tinue its work—it is palsied. The hardened mass now remains between the leaves, a source of inflammation by its very hardness—a greater one by the stimulating or acrid principle that still pervades it, and irreparable mischief is speedily effected. The animal dies of inflammation of the maniplus; and, after death, this stomach is found as hard and as round as a ball. The food contained between the leaves is dry and brittle; it may be rubbed to powder between the fingers; the impression of the papillæ of the leaves is upon it; nay, so spasmodic has been the condensation, that the papillæ have been forced into the substance of the interposed mass, and cannot be separated, without leaving the cuticular coat behind.

What are the previous symptoms? The author is unable to relate them clearly, and in their proper order. The diseases of the sheep have not been taught in our schools by those who are capable of teaching them. The veterinary-surgeon knows little about them, except what he has learned from his own diligent and anxious observation; and he has not had the opportunity, nor perhaps the inclination, to communicate them to his brethren. We ask once more—when will agriculturists be wise, and demand the institution of a school in which their best interests are not forgotten?

Most of the symptoms of obstruction of the maniplus are those of general inflammation or fever, such as, difficult breathing, dilated nostrils, quickened and full pulse, injection of the conjunctival and nasal membranes, dryness of the muzzle, depressed and cold ears, heat at the base of the horn in the horned breeds, frequent and painful cough, a singular swaying motion of the body backwards and forwards, loss of appetite, cessation of rumination, diminution or cessation of milk, and occasional trembling of the muscles. There will likewise be costiveness—not straining with a fruitless endeavour to void fæces, but the cessation of the evacuation of them. These will be the usual earlier symptoms: to them will succeed a stretching out of the neck, a protrusion of the eye, a discharge of frothy or slimy fluid from the mouth, and of mucus tinged or streaked with blood from the nose, and the proportion of blood gradually increasing; the pulse becoming still quicker but small, the ears colder, and even the roots of the horns cold, the breathing more laborious, and the general strength of the animal wasting. Occasionally there will be temporary delirium, accompanied by attempts to do mischief. If, finally, to these are added the want of certain symptoms that characterize other diseases—if there is no great degree of stupor—if the character of the disease from the commencement has not been half, or total unconsciousness—if the flanks are not rounded, either hard and incompressible, showing that the rumen is gorged with food, or giving way to pressure and resonant, betraying the extrication of gas—if there is no yielding fullness below telling of dropsy—if none of these things are found, obstruction of the maniplus will be pretty clearly indicated, and, especially, if the disease has been preceded by certain circumstances and errors of management that will be presently pointed out.

As to the treatment of this disease, little that is satisfactory can be said. In the early stage of it the animal should undoubtedly be bled, as well to reduce the fever as the spasmodic contraction of the muscles of the maniplus; but, after twenty-four hours have passed, bleeding would only hasten the fatal termination of the case. Purgatives are indicated in every stage, consisting of Epsom or Glauber's salts; from two to four ounces being given at first, according to the size and age of the animal, and an ounce every fourth hour, until plentiful evacuations are produced: the medicine being dissolved in a considerable quantity of warm water, and poured down in the

cautious manner that shall ensure its passage into the maniplus. No solid, or even pultaceous food, should be allowed; but gruel may be placed within the reach of the animal. Warm water should be frequently administered, either by the horn, or the stomach-pump; for by this means a portion of the food retained towards the lower edge of the leaves, and most obstinately detained there on account of the hook-like form of the papillæ at that part, will be gradually softened and washed out; other portions above will gradually descend, and be softened by the stream, and also carried off; and by this mechanical contrivance more good will be effected than the administration of any medicine could produce. It is only when the stomach is partly unloaded, and its energies somewhat restored, that it can sympathize with the action going forward in other parts of the digestive apparatus, and rid itself of the weight by which it is oppressed.

Under what circumstances is this disease of the fardel bag chiefly observed? When the flock has changed its pasture—when it has been driven from soft and succulent food to that which is dryer or harder—when the maniplus, that has been for a considerable time employed in pressing out the juice which is easily extracted, and pulverizing or comminuting that which affords little resistance, is all at once called upon to do double or treble duty, no wonder, then, if its energies are soon exhausted, and it becomes paralyzed. On the other hand, a sudden change from a dry and bare pasture to one that is covered with soft and succulent grass, will, in another way, produce the same effect. The remastication of this food costs but little time and labour, and it is sent to the maniplus much more rapidly than room can be found for it; and thus the action of this stomach is impeded, and at length altogether arrested. Therefore it is that sheep invariably thrive best on farms on which there is little difference of soil in different parts of them. If the soil is poor, the farmer need not despair of getting his sheep in good condition, for all that he has to do is to stock lightly. If he occupies a rich land, he must place more sheep on each acre of ground. With this precaution, and common prudence being exerted in other points, they will thrive in both situations. It is in the change of soil and the change of pasture that the danger consists—chiefly as it concerns the digestive organs, and most of all as it regards the maniplus.

There is another state of the maniplus or *faik* which not unfrequently occurs: it is filled—distended, with soft and putrid vegetable matter. This is when the animal, without precaution, has been removed from dry and bare, to plentiful and succulent pasture; and, as just described, after rumination the maniplus is supplied with grist for the mill faster than it can be disposed of. This accumulates; it distends, and palsies the maniplus, and it becomes quickly decomposed. The portion of it that escapes from the leaves and passes into the intestines, is a source of irritation there; and dysentery—fatal dysentery—is the result.

This is the history of that uncontrollable purging which so frequently follows an injudicious change from poor to succulent pasture. The practitioner who guesses at the cause of this dysentery, must not be afraid of having recourse to purgative medicine. It is the only chance which he has of getting rid of the cause of this unnatural and debilitating discharge. Ounce doses of Epsom salts should be given twice in the first day, and two drachm doses administered afterwards every six hours, until the fœtid smell of the discharge has ceased, and the excrement has obtained a little more consistence. It must not, however, be expected that the dung will for some time assume its usual pelletted form.

One other function of the maniplus should be mentioned. The rumen

secretes an alkaline fluid to assist in the maceration and softening of its contents. The reticulum supplies a mucous fluid to envelope the pellet, and facilitate its return to the mouth for the purpose of rumination. It seems, however, that an acid principle is always concerned in the digestion of the food, or, at least, its conversion into chyme in the true stomach. The food is now approaching that stomach; and in order to prepare it for the change which it is there to undergo, an acid fluid—free acetic acid—is secreted by the glands of the maniplus, and mingles with its contents. This is proved by the fluid, in which portions of the maniplus have been macerated, giving a faint red tinge to paper that has been stained blue by an infusion of red cabbage.

THE ABOMASUM, OR FOURTH STOMACH.

The continuation of the gall-duct leads, by means of the floor of the maniplus, into the abomasum; and, in the healthy state of the digestive organs, the food is received into this stomach in a pultaceous or semi-fluid state. The abomasum is of a conical or funnel-like shape, extending from the third stomach to the beginning of the intestines. The cuticular lining, which has been traced through the whole of the three first stomachs, ceases at the termination of the last of them, and the abomasum displays a soft, villous, mucous surface, like the digesting stomach, or the digesting portion of the stomach, of every quadruped. That surface (*f*, p. 424) is composed of folds, or *rugæ*, running, mostly longitudinally, from the upper to the lower part of the stomach. These rugæ are most numerous and broadest towards the maniplus, and one of them, placed at the entrance into the abomasum, discharges the function of a valve; it gives way before the pressure of the fluid or other matter passing from the third stomach into the fourth, but opposes an almost insuperable obstruction to their return. This explains the reason why vomiting so rarely occurs in the sheep, or, in fact,—meaning by the term vomiting, the return of the food from the fourth or true stomach—is almost never seen, except in the struggles that immediately precede death. Towards the lower part of the stomach these folds are fewer, narrower, and more irregular in their course.

This stomach contains the same number of coats as the preceding ones, but the muscular one is not so strong. The internal one is covered by a mucous substance, in order to shield those beneath from mechanical or other injury by means of the various kinds of substances that occasionally enter the stomach. The sub-mucous, or proper glandular coat, secretes that important fluid, the gastric juice. The lower part of the stomach is guarded by a round projecting substance, by which the entrance into the intestine is contracted, or occasionally closed, and the contents of the stomach prevented, at least for awhile, from escaping until they have fully undergone the digestive process.

The food has not long remained in the abomasum of the sheep at grass, before it is converted into a liquid matter of a brownish yellow colour, in which are floating some very small flocculent fibres. This stomach, in the sheep that has been fed on hay, contains a thicker fluid of a brownish milk colour, with somewhat more substantial fibres suspended in it. The abomasum of the animal that has been fattened with corn exhibits a yet thicker fluid, and usually of an acrid and disagreeable smell: this *bouillie* is composed of a pulverulent farinaceous precipitate, and a yellow-white liquor of the consistence of milk, in which a few oats may possibly be floating.

All these substances have a somewhat acid taste, and turn the red-cabbage paper to a bright red. They are never alkaline except when the

sheep dies from disease, showing that that disease had disturbed the influence of the nervous system, and prevented the secretion of the gastric juice. It is this secretion which gives the acid taste to the contents of the stomach; and, by some vital influence—it cannot be accounted for on any mechanical or chemical principle—converts the greater portion of those contents into one homogeneous fluid termed *chyme**. This is properly the first act of digestion; and the muscles of this stomach are actively employed in bringing every portion of the food, by turns, into contact with, and under the influence of, the gastric juice.

DISEASES OF THE ABOMASUM.

Sufficient is not yet known of the pathology of the sheep to justify any description of the diseases which purely or principally belong to this stomach. It is the principal seat of inflammation when a sheep is destroyed by acrid poisons, whether gathered in the field, or wilfully administered, as arsenic, or corrosive sublimate; or accidentally swallowed with the food, as has been the case with arsenic. The same general distinction likewise occurs between animal and vegetable poisons; the destructive agency of the former appears in patches on the parts with which it has come into contact, and which it has corroded, or inflamed: the inflammation produced by the latter is more diffused. The mischief that has ensued from the incautious use of arsenic, mercury, hellebore, and tobacco, will be best taken into consideration, when the diseases, for the cure of which they are incautiously used, pass in review. The fatal consequences of the coagulation of milk in the stomach of the lamb, belongs to the article on parturition and the general treatment of lambs.

A singular account exists of the rupture of the abomasum in a young lamb. It had the turnsick, and was wandering and falling about, as is usually the case in this disease, when, a few hours before its death, it suddenly fell with unusual force, and was unable to rise again. It abandoned itself to the most violent struggles, the right limbs having evidently more power than the left; and, at length, making its neck the centre of motion, it contrived to turn round almost as rapidly as when it was on its legs. On examining the abdomen, after death, the abomasum was found to be ruptured at its greater curvature, and the rupture extending from the manipulus, almost to the duodenum. There was the same difference in the tunics of the stomach which is usually found in the horse. The peritoneal, or outer tunic, was most torn; the muscular not quite so much, and the glandular and mucous least of all. There was no appearance of inflammation or disease in the inner coat of the stomach, but the whole substance of the abomasum was unnaturally soft. This case stands alone in the records of veterinary-medicine; but, did the sheep oftener come under the cognizance of the veterinary surgeon, the same diseases, and characters of disease, would probably be seen as in the other ruminants †.

BEZOARS, OR CALCULI IN THE ABOMASUM.

The lamb, before weaning, and especially if the teats of the mother have not been cleared of wool, is apt to swallow many fibres of it in the act of sucking. The weaned lamb, and the adult sheep, when licking or nibbling themselves, also collect many fibres in their mouths, which, at length, are swallowed. They pass through the cud-duct; they escape from the leaves of

* Recherches sur la Digestion, par Zedemann & Gmelin, vol. I. p. 357.
† Journal des Sciences Zooiatriques, vii. 242.

the maniplus; and at length are arrested by the valvular projection at the pyloric extremity of the abomasum. A grain of corn, or a small portion of hard and unmasticated food, may have pursued the same course and arrived at the same spot. It forms a nucleus, round which the wool entwines itself; and surrounded by the adhesive mucus of the stomach, other particles of wool, or of undigested food, or of calcareous, or other earthy matters, gradually accumulate on the little mass that is forming. It lies loose in the stomach, and revolves with the motion of the stomach, and assumes somewhat of its form, that of an almond in the shell, or a ball compressed on either side. It varies in size from that of a small nut, to a large almond. Sometimes one only is found in the stomach; at other times twelve or sixteen. They are oftenest found in September and October. That is the time of moulting in the sheep, and the change of coat being usually accompanied by some irritation of the skin, the sheep oftener lick and gnaw themselves, and more of the wool is swallowed. It would seem that, in process of time, these bodies yield to the solvent power of the stomach and disappear, for although they are occasionally to be found at all times, they are neither so large nor so numerous as in the autumnal months.

Their appearance sufficiently indicates their composition. They are usually of a brown colour, approaching to red or to yellow; and they are surrounded by a nap of wool, raised by the attrition of the stomach, as the nap is raised artificially on cloth. This nap has a soft velvety feeling, except more than the usual quantity of mucus and earthy matter has entered into its composition. The ball can be cut by a strong and sharp knife, and this discovers the concentric layers of which it is composed—it will burn when exposed to considerable heat, giving out an empyreumatic smell, and it will dissolve in boiling water. Its taste is acrid, and nauseous. It is most common in lambs, but sometimes found in the oldest sheep.

There is a difference of opinion as to its effect on the health of the animal in whose stomach it is contained. It does not seem probable that one or two would prove injurious either by their friction or their weight; and their specific gravity is not great. Sheep have been killed, in the highest condition, with one or two bezoars in the stomach—on the other hand, sheep very much out of condition, and dying of other diseases, have had several of these concretions in the abomasum.

M. Charlot, an intelligent French veterinary-surgeon, says that he was consulted with respect to a flock of sheep and lambs, of which 25 had died in the course of six weeks. The symptoms were diarrhœa, extreme wasting, and cough; and from the nostrils of many a bloody purulent matter was discharged. He found bezoars—so these concretions are sometimes called—in the stomachs of almost all of them, and one lamb had no fewer than three *. He suspected that the disease, and the mortality which accompanied it, were much connected with the presence of bezoars in the stomach. The cough, the discharge from the nostrils, and the diarrhœa, would rather lead to the suspicion that the lungs were the principal seat of disease, and the phthisical affection of these the inevitable cause of death: but there is nothing improbable in the supposition that a diseased state of the digestive organs, a ready parting with the mucous covering of the stomach, might have much to do with the formation of these bodies. They are far more likely to be the effect than the cause of disease. At all events there are no symptoms which indicate, with any degree of certainty, their existence, and although the concentric layers of which they are composed

* Recueil de Méd. Vét. 1826. 566.

show that they have their periods of growth, and their periods either of rest or decay; and the numerous instances in which they are found in certain months, and the comparative unfrequency of their appearance a few months afterwards, prove that that decay goes on to their utter decomposition and dissolution, still there are no means and applicancies, with which we are acquainted, that will enable us either to prevent their formation, or to accelerate their departure. They have never been discharged through the medium of the intestines, and, consequently, they must be either decomposed in the stomach, or remain there harmless, or producing a degree of irritation proportionate to their size and the firmness of their projecting fibres *.

There is an important organ attached to the rumen, which could not have been earlier described, without breaking the thread of our history, namely,—

THE SPLEEN.

The *spleen*, or *melt*, as in the ox, is proportionately longer and narrower in the sheep than in the horse. It is of nearly one uniform breadth and thickness through its whole extent, but is rounded at each end. It lies on the left side of the belly, closely tied to the rumen through its whole extent. In its healthy state it is of a dark colour, and scarcely yields to pressure; but, on closer examination, it presents a singular spongy struc-

* It does not appear that the English shepherd, whether ancient or modern, stands in much fear of these gastric calculi. It was a different thing, however, on almost every part of the continent. It was long believed that these bezoars—the source of rapid wasting, and ultimate death—were produced by some magical and diabolical art. Not a few unfortunate wretches were sent to the galleys for being concerned in these necromantic outrages. When such absurd fancies had disappeared before the growing intelligence of modern times, it was still supposed that the calculi were frequently swallowed by the sheep; that these animals were exceedingly fond of them, and that a miscreant, who wished to wreak his vengeance on a sheep-master, would sufficiently accomplish his purpose by buying a few of them from a butcher, and strewing them in the way of the flock. A detailed account is given of the trial of two poor labourers, in 1790, who were accused of having attempted this strange species of revenge in France, and who were condemned to pay 1500 livres in satisfaction of the damage they had effected, and to be sent to the galleys for six years. On the interference, however, of the professors of the veterinary school of Alfort—who affirmed that the sheep would not voluntarily eat these concretions; that they found it necessary to force them upon some sheep on whom they had been experimenting; and that, if they were forced upon the sheep, they would fall into the rumen, and could not possibly find their way into the abomasum, which they must reach in order to effect the mischief complained of—the sentence was revoked and the prisoners discharged. The veterinary surgeon who is acquainted with the French language will be much amused by the long account given of this in the fourth volume of "Instructions et Observations sur les Maladies des Animaux Domestiques."

If these bezoars were once thought to be so destructive to sheep, many wondrous virtues were also attributed to them as it regards the human subject. They are not peculiar to the sheep; they are found occasionally in every species of deer and antelope, and also in the elephant, the rhinoceros, and the porcupine, and some other animals. Those from some species of Indian antelopes were highly prized. Some from the elephant and the porcupine were sold at 300*l.* each. They were said to be a charm against the poison of the viper and the scorpion; against vertigo, epilepsy, dysentery, pneumonia, malignant fever, the plague, the leprosy, and almost every ill that flesh is heir to. Edward IV. was preserved from the effects of an empoisoned wound, and the Emperor Charles V. was enabled to dissipate those fearful recollections and anticipations, by which he was haunted, by the astonishing power of the bezoar. All these delusions have passed away, and we wonder that they could have had existence. The concretion in the abomasum is now regarded as an almost harmless thing when in its natural habitation; and when taken from it, as deriving its only worth from its occasionally finding a place in the museum of the surgeon or the naturalist.

ture. It is composed of innumerable cells, of different form and size, in different parts of it; and its blood-vessels, both arterial and venous, freely communicate. Its situation would indicate that it has to do with the function of digestion; but it has been removed from some animals, without apparent injury to that or any other function; and in the sheep, and in all ruminants, it is attached to that stomach in which the inferior office of maceration is alone discharged. In a treatise like the present it would be out of place to enter into the disputed and difficult question of the use of the spleen. The most probable account is, that it is mainly concerned with the colouring of the blood, or the gradual change of the chyle into blood as it passes through the glands of the mesentery, where it becomes mixed with a red coagulable fluid which is supplied by the spleen.

The spleen, however, is a more important organ than has been commonly imagined, and its diseases in the sheep, although not mentioned by any English veterinarian, are of a serious character. They have not been described, because there is much obscurity about their symptoms; but inflammation in the spleen is of far more frequent occurrence in the sheep than is generally believed. M. Tschenlin, a veterinary-surgeon in the Grand Duchy of Baden, was the first to point out this disease. It prevails mostly in July, August and September, before the heat of the summer has passed over, and when the animals are beginning to moult. Almost the first symptoms are those of influenza; the gait becomes uncertain and staggering—the eyes are half-closed, red, and weeping—the appetite fails and rumination ceases—the bowels are constipated—the flanks are swelled—the breathing is laborious, the emaciation rapid and extreme, and the animal often dies in the course of a few days. Sometimes the sheep perishes suddenly, without any, or scarcely any, symptom of previous disease.

After death the paunch is found distended with gas and with food—the latter in a state of putrid fermentation, and necessarily producing the former; the small intestines are in a gangrenous state—the liver is partially decomposed and filled with vitiated bile; but, most of all, the spleen is gorged with blood, softened, enlarged, not unfrequently ruptured, filled with tubercles and ulcers—with, in short, various appearances of disease, but all of them the consequence of inflammation, principally belonging to this gland, and of the most serious character.

The probable causes of a disease so little known must be hinted at with diffidence—blows, falls, long journeys, sudden changes of weather, change of pasturage, coarse pasture, damp or ill-ventilated sheep-houses, pre-existent disease in some other of the contents of the abdomen with which the spleen in process of time participates, and in which, from its vascular structure, it is most violent. There are few parts of the sheep that are more disposed to be affected by the diseases of other visceral organs. The treatment must depend on the character which the disease assumes. If there is much laboured breathing and heat of the muzzle and the horn, bleeding will be indicated; but it must not be attempted if there is the slightest symptom of debility. If it is a single case, there will probably be much inflammatory action which bleeding will relieve; but if it seems to be a prevailing complaint at the time, it will, like every epidemic, assume a typhoid character; and mild aperients, and perhaps gentle stimulants, will be most serviceable. The preventives would be, shelter from the rays of the summer's sun, no long journeys, and no dogging; and the turning on sound pasture, where the appetite might be satisfied with a fair share of exercise, but where the paunch cannot well be overloaded.

The process of digestion being completed so far as the stomachs are

concerned—all the food which has been sufficiently comminuted being converted into the homogeneous fluid, *chyme*, it escapes through the pyloric orifice into the duodenum, or first intestine, there to undergo another and still more important change, namely, to have the nutritive and useful portion separated from that which will yield no nourishment to the frame, and must eventually be expelled as mere fæcal matter. Two other fluids, however, are poured into this intestine—one from the pancreas, and the other from the liver, and both assisting in effecting this separation; it will therefore be more satisfactory to consider first the nature and effects of these fluids, and the structure and diseases of the organs whence they flow.

THE PANCREAS.

The *pancreas* or sweetbread, as in the ox, comparatively smaller than in the horse, although much larger than in any of the carnivorous animals, is found on the left side of the belly, and connected mostly with the duodenum, or partly with the colon, by means of the mesentery, and the ducts of this gland. It is evidently a glandular substance, and composed of an accumulation of minute glands connected together by a cellular texture, each having its own minute duct, and the common one of the whole, running into the biliary duct, two inches before that vessel enters the duodenum. The letter *h*, in the cut (page 424), indicates the spot at which it perforates the coats of the duodenum.

The pancreas of the sheep secretes a transparent, adhesive fluid, of a slightly saline taste, containing a great deal of albumen, and sufficient acid to turn the blue cabbage-paper red. Different opinions prevail as to its use. It is probably designed to mingle with and assist in the perfect assimilation of the chyme, and thus prepare it for the change which it is to undergo in this intestine. Inflammation, and gangrene, and ulceration, and cancer of the pancreas, have been observed in the human being; and the author has found induration and tubercles in the pancreas of the sheep: but he is altogether ignorant of the cause, the progress, the symptoms, or the proper treatment of these diseases.

THE LIVER.

It seems to be a law of comparative anatomy that the bulk of the liver shall be in an inverse proportion to that of the lungs. In the horse the lungs are necessarily capacious. He needs a large supply of arterial blood in order to answer to its rapid expenditure when the utmost exertion of strength and speed are required from him. In the ox the lungs are less developed; yet this animal is used in some countries as a beast of burden, and employed in Great Britain in agricultural labour; the lungs, therefore, are of considerable size, and the liver, although much larger than in the horse, is restricted in its growth. In sheep little exertion of strength or speed is required; and the lungs are smaller compared with the size of the animal. The liver is proportionally larger: it is about one twenty-fifth part of the whole weight of the animal, or nearly double the proportionate size which it is in the human being*.

The liver of the sheep differs little in form and situation from that of the ox. It is placed in the anterior part of the abdomen, between the maniplus and the diaphragm. It has but two principal lobes, separated by a triangular scissure, through which, in the pregnant ewe, the umbilical vein of the fœtus passes. Its office is to receive the blood that is returned from the

* Gasparin des Maladies des Bêtes a Loire, p. 42.

intestines; to separate from the blood, or to secrete by means of it, a fluid termed bile, and to transmit the remaining part to the lungs, there to undergo the usual process of purification, and be changed to arterial blood. The vessel to which the bile is first conveyed is the *gall-bladder;* where it is stored up for future use, and perhaps undergoes some change. A portion of the watery parts of the bile is certainly evaporated in the gall-bladder, and the remainder is thicker and more powerful. From the gall-bladder it is conveyed to the first intestine, the duodenum, either in a constant but slow stream, or probably in a larger stream while the work of digestion is going on; the supply from the gall-bladder, and probably the secretion from the liver, being stopped at other times. A little before this duct—the *ductus choledochus*—reaches the intestine, it is joined and perforated by the duct from the pancreas. The fluid from the pancreas is mixed with that from the liver, and the compound flows on to the duodenum.

THE BILE.

The fluid which is secreted by the liver, or separated from the blood passing through that gland, is called *the bile*. There have been great disputes as to its nature and use. Some have considered it as an excrementitious substance. They are probably not very wrong in this; but the excrementitious substance so separated is, when in due quantity and healthy condition, a very useful one. Its separation keeps the blood in that state in which it can best contribute to the nutrition of the frame, and the healthy function of its different organs. The fluid separated and discarded, stimulates the mucous membrane of the intestines, and excites it to the secretion of that mucus which is necessary for its protection and healthy state. By mixing with the chyme it hastens the necessary separation which must take place between the nutritive and innutritive parts, or, in other words, the conversion of the chyme into chyle—chyle being the nutritive part with that which is excrementitious precipitated or otherwise separated. The bile, while it stimulates the mucous membrane, increases the peristaltic motion of the intestines, and hastens the passage and escape of the fæcal matter. By virtue of its chemical qualities, it prevents the putrid decompositions to which many substances, and especially vegetable ones, are subject when inclosed within the intestines and subjected to a warm temperature. This fluid being of an alkaline nature, neutralizes a part of the acid which is often developed in the intestines. It also assists in the assimilation, or conversion into nutritious matter, of many of the contents of the intestines, and parts with some of its own constituents. The picromel and osmazome, having never been detected in the excrement, are supposed to be taken into the circulation.

DISEASES OF THE LIVER.

Oxen and sheep are more exposed to diseases of this organ than is the horse, from the proportionate greater development of it and the excess of secretion from it. *Inflammation of the liver*, chronic or acute, is not only the foundation or the forerunner of rot; but, in its simple state, is not of unfrequent occurrence, and is very fatal. The sheep hangs his head, is dispirited, partly or entirely refuses his food, heaves at the flank, is unwilling to move, and the bowels are usually costive. These are symptoms of common fever; but if to them are added yellowness of the skin, and of the membrane of the eye, tenderness when pressed on the right side, and *lameness of the right fore-leg*, it is plainly enough inflammation of the liver. The prevailing cause is excess of nourishing food, arising from too great

haste to prepare the animal for the market. In many of the fatted and prize sheep that are destroyed by that murderous disease so conveniently termed *inflammation*, the seat of the mischief was the liver, as is plainly enough indicated by the engorgement, and friable, broken-down texture of that organ. Marshy grounds that may not absolutely produce the rot are too frequently the cause of inflammation of the liver. Bleeding, Epsom salts, and spare diet will be the most effectual means of cure. Sometimes inflammation of the liver appears as an epidemic among sheep. In several parts of France, and particularly in Holland, this has been observed. In both places they give salt to the sheep, both as a preventive and a cure. It is mentioned by no English author; but if the farmer will observe the early symptoms of that illness in his sheep, which so far takes on the character of rot, that the patient pines away to a skeleton, and after death is found to have an enlarged liver, with numerous flukes in it, he will suspect that in the early stage the disease was pure inflammation of the liver, and that he might have saved his sheep had he adopted the proper means.

A visit to the slaughterhouses will show that small calculi often exist in the gall-bladder of the sheep; but the author is not aware of any symptoms which indicate their existence, or of any disease that has certainly accompanied them.

THE ROT.

This disease is classed among those of the liver, because, except when the animal dies perfectly worn out by the malady, the most striking and the supposed characteristic mischief is found in this organ.

So far as the author has been enabled to ascertain, more than one million of sheep and lambs die in every year from this disease. In the winter of 1830-31 this number was far more than doubled; and had the pestilence committed the same ravages throughout the kingdom which it did in a few of the midland, eastern, and southern counties, the breed of sheep would have been in a manner extirpated*.

This disease is not peculiar to England. Many sheep are destroyed by it in Germany. In the north of France they are frequently swept away by

* Mr. W. R. Brown stated before a Committee of the House of Lords, in 1833, that he lost 500 sheep in four months, and that he sold 400 more at 3s. 8d. each, so that he might be said to have lost 900 in all, out of a flock of 1400. Mr. W. Simpson stated that one of his neighbours lost all his sheep except three. Mr. John Buckley asserted that many lost all their flocks; to which Mr. John Western Peters added, that he knew some instances in which the farmer lost the whole of his stock, and bought a second stock, and lost that too. Mr. Smallpiece stated that, in some parts of the wealds of Surrey and Sussex, there was not a single sheep now left; "the loss extends," added he, "beyond the mere value of the sheep: it embarrasses the whole operation of the farm, and throws it out of cultivation; for the farmer depends on his sheep for much of his manure, and probably there are no other means of procuring it." The consequence of all these losses was, that in 1833, two years after this dreadful destruction, there were 5000 sheep on every market-day in Smithfield less than what used to be the average number; and 20,000 less than the usual number at Weyhill fair. If another testimony is added, it is to awaken the farmer from the apathy with which he seems to regard his own losses and those of his neighbours, and to induce him to seek in the better draining of his soil, of the better management of his sheep, and the foundation of experimental farms, and agricultural and veterinary schools, a remedy for this national evil. If it is fair to draw any conclusion with regard to the future from what these institutions have already produced, the plague would probably be in a great measure staid. "In the year 1824," says Mr. John Crampe, of the Isle of Thanet, "I had improved my farm at Ashford, in the weald of Kent, and I had a great stock upon it; but in the ensuing winter I was visited by that dreadful disease the rot, which carried away 3000*l.* worth of my sheep in less than three months, and I gave up my farm."—Evidence before the House of Lords in 1833.

it; and in the winter of 1809 scarcely a Merino in the whole of that kingdom escaped. It is destructive as far in the north of Europe as Norway; and even the most southern provinces of Spain have had occasion to mourn its ravages. It has thinned many a flock in North America, and in Van Diemen's Land and Australia it has occasionally been as destructive as in the worst undrained land in England.

It has existed from the earliest period of medical and agricultural history. Hippocrates gives a very faithful account of it, erring only in considering the flukes as hydatids; or rather his attention was confined to the hydatids which are now frequently found in the liver of these sheep. In various periods of English history accounts are given of its ravages; and the description of it by our earliest agricultural writers corresponds with what we see of it at the present day.

The early symptoms of rot are exceedingly obscure: this is much to be deplored, because in the first stage of it alone does it often admit of cure. The animal is dull, lagging behind his companions—he does not feed so well as usual. If suspicion has been a little excited by this, the truth of the matter may easily be put to the test, for if the wool is parted, and especially about the brisket, the skin will have a pale yellow hue*.

The eye of the sheep beginning to sicken with the rot can never be mistaken: it is injected but pale; the small veins at the corner of the eye are turgid, but they are filled with yellow serous fluid, and not with blood †. The caruncle, or small glandular body at the corner of the eye is also yellow. Farmers very properly pay great attention to this in their examination or purchase of sheep. If the caruncle is red, they have a proof which never fails them that the animal is healthy. If that body is white they have no great objection or fear—it is generally so at grass: but if it is of a yellow colour they immediately reject the sheep, although he may otherwise appear to be in the best possible condition; for it is a proof that the liver is diseased, and the bile beginning to mingle with the blood. There is no loss of condition, but quite the contrary, for the sheep in the early stage of rot has a great propensity to fatten. Mr. Bakewell was aware of this, for he used to overflow certain of his pastures, and when the water was run off, turn those of his sheep upon them which he wanted to prepare for the market. They speedily became rotted, and in the early stage of the rot they accumulated flesh and fat with wonderful rapidity. By this manœuvre he used to gain five or six weeks on his neighbours.

If that which has been just stated of the bile (page 443) is true, it may easily be conceived that a small increase in the quantity and stimulating property of it, which would be the result of nascent inflammation of the liver, would increase the propensity to fatten. This would last but a little while, for the digestive organs would not long bear an excess of stimulus. They would be exhausted by their temporary increase of action; and wasting, more rapid than the previous augmentation of condition, would be inevitable. Bakewell was on the watch for this, and the moment when the digestive powers were beginning to be impaired, his sheep were sent to the butcher. It was, after all, an unnatural state of condition into which the animal was brought. The muscular fibre was paler, and approaching to yellow; and

* "And also take the shepe upon the wol on the side, and if the skin be of a ruddye colour and dry, then is he sound, and if it be pale-coloured and watery, then he is rotten."—The Booke of Husbandrye, by Sir Anthony Fitzherbert, 1532.

† "Take both your handes, and turn up the lid of his eye, and if it be ruddye and have red stringes in the white of the eye, then he is sound, and if the eye be white like talowe, and the stringes dark-coloured, then he is rotten."—Booke of Husbandrye.

the fat was flabby. The meat was tender, and perhaps would please certain epicures; but it had not the firmness nor the flavour of mutton honestly fattened, and probably was not quite wholesome.

As the disease becomes confirmed the yellow tinge begins to spread—the muzzle and the tongue are stained—the animal is more dull and dispirited—his false condition rapidly disappears—the membrane of the nose becomes livid—the tongue gradually assumes the same character—the eyes are dull, and their vessels charged with a yellow-brown fluid. The breath now becomes fetid—the bowels variable—sometimes costive, and at other times loose to a degree that defies the power of medicine. The skin often becomes spotted with yellow or black—the emaciation is more and more rapid—the general fever increases—the vessels of the eye are more distended and red—the caruncle is considerably enlarged—the skin becomes loose and flabby, and if it is pressed upon, a peculiar crackling sound is heard—the wool comes off when pulled with the slightest force—the appetite entirely fails—the belly begins to enlarge—on pressure fluid is easily recognized within it, and hence one of its names, "the hydropic" or dropsical rot. The animal is weak in every limb—a violent purging is now very frequently present—the sheep wastes away to a mere skeleton, and at length he dies—the duration of the disease being from two to four or six months. At some uncertain period of the disease there is an œdematous swelling on the upper part of the throat from an infiltration of fluid into the cellular substance of that part. The sheep is then said to be *chockered;* and from this swelling the disease is sometimes called *the watery poke.*

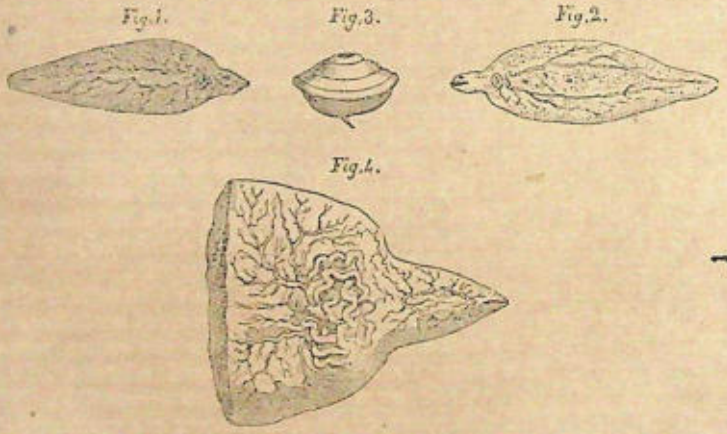
When a rotted sheep is examined after death, the whole cellular tissue is found to be infiltrated, and a yellow serous fluid everywhere follows the knife. The muscles are soft and flabby: they have the appearance of being macerated. The kidneys are pale, flaccid, and infiltrated. The mesenteric glands enlarged, and engorged with yellow serous fluid. The belly is frequently filled with water, or purulent matter; the peritoneum is everywhere thickened, and the bowels adhere together by means of an unnatural growth. The heart is enlarged and softened, and the lungs are filled with tubercles. The principal alterations of structure are in the liver. It is pale, livid, and broken down with the slightest pressure; and on being boiled it will almost dissolve away *. When the liver is not pale, it is often curiously spotted. In some cases it is speckled like the back of a toad. Nevertheless, some parts of it are hard and schirrous; others are ulcerated, and the biliary ducts are filled with flukes. Here is the decided seat of disease, and it is here that the nature of the malady is to be learned. *It is inflammation of the liver.* In consequence of this the secretion from the liver is increased—at first scarcely vitiated, and the digestive powers are rendered more energetic; but soon the bile flows so abundantly that it is taken into the system, and the eye, the brisket, the mouth, become yellow. As the disease proceeds, the liver becomes disorganized, and its secretion more vitiated, and even poisonous; and then follows a total derangement of the digestive powers. The whole system sympathizes—every viscus of the chest and the abdomen is gradually involved, and the animal exhibits at its death a state of general disorganization which accompanies scarcely any other malady.

The liver attracts the principal attention of the examiner: it displays the

* "And also if thou cut the lyver, there will be lyttle quickenes lyke flokes, and also the lyver will be full of knots, and white blisters if it be rotten, and also seeth the lyver, if it be rotten it will breake in peces, and if it be sound it will hold together."—The Booke of Husbandrye.

evident effects of acute and destructive inflammation; and still more plainly the ravages of the parasite with which its ducts are crowded. Here is plainly the original seat of disease; the centre whence a destructive influence spread on every side. Whatever else is found, it is the consequence of previous mischief existing here. Then the first inquiry is a very limited one—the nature of this hepatic affection, and the agency of the parasites that inhabit the liver. Are they the cause or the consequence of disease?

The Fluke—the *Fasciola* of Linnæus—the *Distoma hepaticum* of Rodolphi—the *Planaria* of Goese—is found in the biliary ducts of the sheep, the goat, the deer, the ox, the horse, the ass, the hog, the dog, the rabbit, the guinea-pig, and various other animals, and even in the human being*. It is from three-quarters of an inch to an inch and a quarter in length, and from one-third to half an inch in greatest breadth.



Figs. 1 and 2 represent this parasite, of its usual size and appearance, and its resemblance to a minute sole, divested of its fins, is very striking. The head is of a pointed form, round above, and flat beneath; and the mouth opens laterally instead of vertically. There are no barbs or tenacula, as described by some authors. The eyes are placed on the most prominent part of the head, and are very singularly constructed (fig. 3). They have the bony ring of the bird, by means of which the aqueous humour is made occasionally to assume a more conical form, and the lens is removed to a greater distance from the retina; the eye thus adapting itself to the exceedingly great difference of distance at which it is sometimes necessary for the bird to discover his prey. The same mechanism probably enables the fluke-worm to adapt his eyes to the different density of the media through which he moves. The anastamoses of the blood-vessels which ramify over the head are plainly seen through a tolerable microscope. The circulatory and digestive organs are also evident, and are seated almost immediately below the head. The situation of the heart is seen in fig. 4, and the two main vessels evidently springing from it, and extending through almost the whole length of the fluke. Smaller blood-vessels, if so

* The French call this parasite the *Douve*, from a species of ranunculus, the eating of which is supposed by them to produce the worm in the liver. The Germans call it *Leberwurm*, or *Leberegel*; the Dutch, *Leverworm*; the Danes, *Fuareflynder*; the Swedes, *Levermask*; the Italians, *Bucciola*; and the Spaniards, *Caracolillos*, or *Serillas*.—Faune des Medecins, vol. v. p. 131.

they may be called, ramify from them on either side. The convolutions of the bowels appear in fig. 3, and the vent, both for the fæces and the ova, and probably for the connexion between the sexes, is on the under part, and almost close to the neck. There is a small protuberance seen at the anterior part of the intestines, and extending through them, which seems to be the liver. The lower part of the animalcule is composed entirely of muscular substance; but it is exceedingly friable, and readily breaks. The microscope has not brought to view the stomach of the animal, nor its respiratory apparatus.

In the belly, if so it may be called, are almost invariably a very great number of oval particles, hundreds of which, taken together, are not equal in bulk to a grain of sand. They are of a pale red colour, and are supposed to be the spawn or eggs of the parasite. Great numbers of the same particles are also found in the biliary ducts. They retain the same form, but they are often of various colours—corresponding, perhaps, with the degree of vitality which they possess, or the time that they have remained floating in the ducts of the liver. They are also found in every part of the intestinal canal; and, from November until April, they may occasionally be seen in the dung of the healthy sheep, and swarming in that of the diseased one, and particularly the rotted sheep.

No difference of sex has yet been discovered in the fluke-worm, and it is believed to be an hermaphrodite.

There can be no doubt that the eggs are frequently received in the food. Having been discharged with the dung, they remain on the grass, or damp spot on which they may fall, retaining their vital principle for an indefinite period of time. The ova of various animals, larger and smaller, and of every description, like the seeds of plants, retain their vitality during an almost incredible period. They find not always, or they find not at all, a proper nidus in the places in which they are deposited; but taken up with the food, escaping the perils of rumination, and threading every vessel and duct until they arrive at the biliary canal, they burst from their shells, and grow, and probably multiply. "On killing a sheep," says a writer in the Bath Society Papers *, "I examined the viscera carefully, and in some of the passages leading from the liver, and which appeared turgid, I found a whitish, thick liquor, which appeared to be all in motion. On applying a pocket-glass, I found it to contain hundreds of these flukes, which were apparently just hatched, and about the size of mites. These, if the sheep had not been killed, would probably have soon obtained their usual size, and destroyed the animal." Of the existence of the fluke out of the intestines there is no proof, any more than of many other of the entozoa, and nothing can with propriety be positively affirmed of it; but from their being almost invariably found in the livers of diseased sheep and many other animals, it is highly probable that they have existence out of the body, and either on wet and marshy grounds, or in ponds or rivers. If they have existence there, it is probably in the same form as that in which they appear in the sheep, for it is in their last and most perfect form that the insects of various characters perpetuate their species †.

Leeuwenhoeck says that he has taken 870 flukes out of one liver, exclusive of those that were cut to pieces or destroyed in opening the various ducts. In other cases, and where the sheep had died of the rot, there were not found more than ten or twelve.

* Bath Society Papers, vol. ii. p. 118.

† Leeuwenhoeck's Micrographia, Art. Flukes.

Then, is the fluke-worm the cause or the effect of the rot? To a certain degree both. They aggravate the disease; they perpetuate a state of irritability and disorganization, which must necessarily undermine the strength of any animal; they unnaturally distend, and consequently weaken the passages in which they are found; they force themselves into the smaller passages, and, always swimming against the stream, they obstruct the flow of the bile, and produce inflammation by its accumulation; they consume the nutritive juices by which the neighbouring parts should be fed; and they impede the flow of the bile into the intestines, by clogging up the ducts with their excrement and their spawn. Notwithstanding all this, however, if the fluke follows the analogy of other entozoa and parasites, it is the effect and not the cause of the rot. The ova are continually swallowed by the sound animals and the diseased; but it is only when the fluids are altered, and sometimes essentially changed, and the condition of the digestive organs is materially impaired, that their appearance is favoured, or their multiplication encouraged. They resemble the birds of prey, that hasten the death and the demolition of the fallen deer, but who were not concerned in bringing the animal down.

It is far from certain that the existence of a few of these entozoa may not form a part of a healthy constitution, the liver being excited to a more uniform secretion of good bile. An intelligent pupil informed the author that when in autumn a sheep used to be slaughtered every day for the use of the harvest-men on his father's farm, and he was accustomed to glean a little instruction by a *post-mortem* examination of every sheep, it was rarely that he found one without a fluke or two. A sheep of better condition than the rest was sure to have them; and it was only in those that were selected because they were thought to have given indications of approaching ailment that they appeared to be numerous.

The circumstance of the ease with which flukes may be produced in the liver of various animals affords a strong presumption that they are the effect and not the cause of disease. If a rabbit is fed for a few days only entirely on cabbage, or other watery food, his belly enlarges, and his muscle and fat waste speedily away. If his food is not changed he speedily dies, with the enlarged liver, of rot, and the flukes which accompany rot. They here plainly accompanied, or were produced by, that derangement of the digestive organs caused by the administration of improper food. The author does not, however, dare to add, what would be a decisive argument, if true, that some sheep die rotten, and no flukes or traces of their ravages are found in the liver. He has never seen the liver of a rotted sheep in which the fluke-worm, or traces of his previous existence in the liver, were not sufficiently plain.

What, then, is the cause of the rot in sheep? The knowledge of the cause can alone guide us to the cure, or at best to the prevention of it. It is not, as some have maintained, the consequence of "sudden fall in condition;" for the early stages of it are characterised by the very reverse, by an improvement in condition—an accumulation of flesh and fat so rapid that nothing but incipient rot could produce. It does not arise from deficiency of food; a sheep may be reduced to the lowest state of condition—he may be starved outright, but the liver would not be necessarily or often in a diseased state. Thousands of sheep are irreparably ruined by bad and scanty nourishment; but the symptoms of their decline bear no affinity to those of rot. It is not to be traced to the effects of a sudden flush of grass. The determination of blood to the head, diarrhœa, dysentery, might be thus produced, but not one symptom resembling the rot. Some persons, led away

by a favourite theory, have traced it to defective ventilation; but in the closest keeping to which the British sheep is usually committed there is no foul air to be got rid of, and defective ventilation would be words without meaning. The sheep are exposed to the winds of heaven protected only by the hurdles of the fold, or by the shelter of a neighbouring hedge. They may get catarrh, they may lay the foundation for pneumonia, but diseases of the liver are quite out of the question as a consequence of folding.

The rot in sheep is evidently connected with the soil or state of the pasture. It is confined to wet seasons, or to the feeding on ground moist and marshy at all seasons. It has reference to the evaporation of water, and to the presence and decomposition of moist vegetable matter. It is rarely or almost never seen on dry or sandy soils and in dry seasons; it is rarely wanting on boggy or poachy ground, except when that ground is dried by the heat of the summer's sun, or completely covered by the winter's rain. In the same farm there are certain fields on which no sheep can be turned with impunity. There are others that seldom or never give the rot*. The soil of the first is found to be of a pervious nature, on which the wet cannot long remain—the second takes a long while to dry, or is rarely or never so. The first, perhaps, is a sloping ground, from which the wet soon runs—in the level and tenacious soil of the other it remains during many a week or month. "In the parish of Little Gaddesden," says old Ellis, "there is a common just before our houses, that feeds my flock in the summer-time, and the flocks of several other persons. This common has two sorts of situations on it—some of it lies sloping, and the rest lies flat. The part of it next my farm, and where my sheep generally graze, lies mostly on *a hanging*, and they never take the rot there, because the waters run off before they can wet the ground enough to make it dangerous to sheep; whilst in another part of this common, where it lies flat, a farmer lost thirty of his folding-sheep in one year, out of fifty or sixty in all†."

The uninclosed commons with which almost every part of the country once abounded might, in some respects, be convenient and advantageous to the cottager; in others they were injurious even to the cottager himself, and to the little farmer, while they robbed the country of many hundred thousands of acres of useful and available land—for on account of their low situation, or the poachy spots and stagnant ponds which they contained, they rotted almost every sheep that ran upon them.

Some seasons are far more favourable to the development of the rot than others, and there is no manner of doubt as to the character of those seasons. After a rainy summer, or a moist autumn, or during a wet winter, the rot destroys like a pestilence. A return and a continuance of dry weather materially arrests its murderous progress. Most of the sheep that had

* A correspondent of the author's, residing in Lincoln, thus writes with regard to this circumstance. Improbable and inconsistent as such a course of proceeding would seem to be, the author could produce more than a score examples confirmatory of the perfect truth of the remark—"The obstinacy of farmers in turning their sheep on rotting lands is most singular and destructive. If there is a common that has from time immemorial been noted for rotting, they are sure to be sent there."

† Ellis's Shepherd's Sure Guide, 1749. This work is recommended to every sheep proprietor, as containing a vast deal of useful information with regard to the management of sheep. The disease under consideration is treated of at considerable length. There is much that will not stand the test of the increased knowledge of the present time, and there are many stories that will raise a smile on the gravest countenance; but there is a great deal of sterling common sense in it, and it embodies the most valuable part of the sheep-knowledge of the middle of the eighteenth century.

been already infected die; but the number of those that are lost soon begins to be materially diminished.

It is, therefore, sufficiently plain that the rot depends upon, or is caused by the existence of moisture. A rainy season, and a tenacious soil, are fruitful or inevitable sources of it.

But it is not every kind of moisture that will produce the rot. A meadow by a river side may afford as safe a pasture as can possibly be wished. There is continued evaporation from the stream, but it produces no rot; and the sheep often bathe their feet in it as they drink, but no harm ensues. The river overflows—the meadow is, during many a successive day, covered with water, and the sheep, almost up to their knees, search for their food amidst it. The foundation may be laid for foot-rot; probably for catarrh, or more serious chest affection; but the liver-rot is out of the question.

The water gradually subsides, and the river returns to its natural banks. The superficial soil of the meadow, or its substratum, is formed of tenacious clay, and it remains wet during a considerable time. This damp surface is exposed to the united influence of the sun and air. The farmer knows to his cost how soon the danger then commences; for if he removes not his flock to a drier pasture he inevitably loses a fearful proportion of them by the rot.

There is a pond of water in the field; it is too plentifully supplied with springs to be ever dried, and its banks are gravelly, or naturally or artificially too well clayed, to become wet and poachy. No harm ensues although the sheep daily flock around it to quench their thirst. The owner attempts to drain it, and is probably unable perfectly to accomplish his object. He now has, or at least in wet weather he has, a moist and soft surface, and, as experience will too soon teach him, a most dangerous spot. "A grazier of my acquaintance," says Dr. Harrison in his valuable 'Inquiry into the Rot in Sheep,' "has for many years occupied a large portion of an uninclosed fen, in which was a shallow piece of water that covered about an acre and a half of land. To recover it for pasturage, he cut in it several open ditches to let off the water, and obtained an imperfect drainage. His sheep, immediately afterwards, became liable to the rot, and in most years he lost some of them. In 1792, the drains failed so entirely, from the wetness of the season, that he got another pond of living water, and sustained in that season no loss in his flock. For a few succeeding years he was generally visited by the rot; but having satisfied himself by experience that whenever the pit was, from the weather, either completely dry, or completely under water, his flock was free from the disorder, he attempted a more perfect drainage, and succeeded in making the land dry at all times. Since that period he has lost no sheep from the rot, though, until within the last few years, he continued to occupy the fen."

A farmer has upon his estate a plot of ground which he boasts never rots his sheep; and he has another on which he scarcely dares to turn them for a day. There comes a deluge of rain, and he hurries his finest sheep into the upper and safer closes, and is compelled to leave a few in the lower and more dangerous parts. To his astonishment many of his best sheep perish, and he does not lose one of his worst. The profusion of rain had converted the upper pasture into a moist rotting ground, and had covered the lower one with water, and so interrupted the development of its destructive property.

A Sussex breeder, in 1830, sent 800 of his breeding ewes at the end of January into pasture under the hills, in order to feed off some of the long grass immediately after a heavy fall of snow was carried off by a thaw.

Before March all the sheep took the rot and died. Not one lived to drop a lamb, although that pasture had never before been known to produce the rot. In this year of general rot the disease was beyond comparison more violent than at any other time. A farmer could not get 5*l.* for more than 300 skins, the disease had infected and putrefied every part so thoroughly*.

Then there is something more than moisture necessary for the production of the rot. The ground must be wet, and its surface exposed to the air; and then the plants, previously weakened or destroyed by the moisture, will be decomposed; and, in that decomposition, certain gases or miasmata will be developed, that cannot be long breathed, or scarcely breathed at all, by the sheep, without producing the rot. The miasmata developed from fenny and marshy situations produce certain disorders in the human being, which principally affect some of the internal viscera. In ague the spleen is the victim; in bilious diseases the liver. In the rot in sheep the liver is the organ mostly affected; it becomes inflamed, enlarged, indurated—then softened—ulcerated, and prepared to be the residence of the fluke.

Chemistry, even in its present advanced state, will afford no means of analyzing these deleterious gases; and it is a matter of little practical consequence to be acquainted with their constituent principles. Of the source whence they are derived there can be no doubt—the decomposition of vegetable substances from the united influence of air and moisture: the means, however, of removing the source of the evil is, in the great majority of cases, practicable and easy.

The mischief is effected with almost incredible rapidity. "A farmer in the neighbourhood of Wragby, in Lincolnshire, took twenty sheep to the fair, leaving six behind in the pasture on which they had been summered. The score sent to the fair, not being sold, were driven back, and put into the same field in which the six had been left. In the course of the winter every one of them died of the rot; but the six that had been left behind all lived and did well. There could be no mistake with respect to this fact, as the sheep sent to the fair had a different mark from that of the six that were left at home. The loss of these twenty sheep can only be accounted for on the supposition that they had travelled over some common, or other rotting ground, and there became infected †."

The same writer relates another instance which corroborates this opinion: "A sheep, belonging to a lot of twenty, being lamed in consequence of a broken leg in getting out of Burgh fair, in Lincolnshire, the nineteen were suffered to range on a common at the end of the town until a cart could be procured to carry the maimed sheep home. The nineteen all died rotten, while the sheep with the lame leg continued perfectly free from the disease ‡."

"A sheep-breeder on the downs of Dorset, during my excursion in that county, showed me a small hollow place, about half an acre in extent, where was a sort of basin to hold water, to which the shepherd took the flock, about 800, and let them drink; the whole of the time they were there being about fifteen minutes. Upwards of 200 of them became rotten§."

To this shall be added one fact more, which recently occurred. A farmer in Norfolk bought a lot of sheep warranted sound; for the system of warranty sometimes extends to cattle and sheep, and ought so to extend much more frequently than it does. The greater part of them died of rot

* Letter to the Author from Mr. Sewell, V.S. of Brighton.
† Parkinson on Live Stock, i. 421.
‡ Do. i. 422.
§ Do. 422.

in the course of the winter. The purchaser brought his action for the recovery of the price paid for them. The defendant satisfactorily proved that he never had had a rotted sheep on that part of the farm on which these were bred and grazed. A considerable sum of money was spent in litigation; when at length it was discovered that the night before the sale—the whole town and its neighbouring pastures being occupied—the sheep were turned into a field in a neighbouring village, and which field bore a suspicious character with regard to this disease. There was then little doubt on the mind of either party that the mischief had been done on that night.

Dr. Harrison confirms these facts. He refers to a farm in Lincolnshire, which consists of high and low lands, of a loamy and tenacious nature. While a brook which runs through the farm remains overflowed, and the water continues upon the adjoining flat grounds, the sheep never suffer any inconvenience, though they are frequently obliged to wade for their provision; but as soon as the flood is subsided they can be tainted in a quarter of an hour, while the land retains its moisture, and the weather is hot and sultry. The butchers were well acquainted with this fact, and the importance of it; for, when they purchased any fat sheep from him, they stipulated that they should be turned on Mr. Harrison's meadow before they were sent away, in order that they might be tainted with the rot, and thus improve more rapidly*.

The miasmata arising from similar causes, and producing disease in the human species, are capable of being conveyed to a considerable distance without losing their infectious property. It is not only dangerous to live on marshy grounds, but in the neighbourhood of them; and there is a great difference in the health of the inhabitants of the adjacent country accordingly as the wind blows to or from the marsh. The minute deviations from health in the domesticated quadruped are not yet sufficiently understood, and indeed have scarcely been studied at all, and therefore it cannot be confidently stated that sheep in the neighbourhood of rotten grounds enjoy that perfect state of health which they would in other situations; but so far it has been, fortunately for the sheep-master, ascertained, that it is necessary for them to pass over or probably to graze on rotting ground in order to become infected to any dangerous extent. A farmer, in addition to other land, had a dry hilly sheep-pasture, which he stocked rather hard. In a hollow place of that pasture was a swampy pond, which was preserved for the sake of supplying the wheel of the thrashing machine. The farmer, notwithstanding the dry and favourable nature of his sheep-pasture, had occasional losses from rot in his flock: he fenced in the pond, and prevented the sheep from having access to the swampy border that surrounded it, and the rot entirely ceased †.

Many of the circumstances connected with this disease now become perfectly intelligible. The rot rarely appears before the close of the spring, except there is a great deal of wet towards the commencement of the summer; and by the end of November few new cases of it are observable. The grass is too young and vigorous in the early part of the spring to be subject

* Harrison's Inquiry into the Rot in Sheep. Even lanes and ditches can thus inoculate and destroy a flock. The shepherd of Mr. Harrison left his flock in a lane for not more than an hour, while he attended a broken-legged sheep. They strayed into no common or other pasture, but they grazed on the sides of the ditches in the lane. The injured animal was then sent home in a cart, and the rest were driven on. The shepherd soon discovered that all had contracted the rot except the lame sheep, and, as they never separated but at that time, it was reasonable to conclude that the disorder was acquired by feeding in the road and ditch bottoms.

† See an excellent article on the rot in the Quarterly Journal of Agriculture, June, 1835.

to much putrefaction, and it is only a long continuance of wet weather which can so far injure and weaken it as to cause it to decay and become putrid. For the same reason, in the spring of the year, a flock of sheep may be turned into low ground, nay, into the very water-meadows, without being subject to rot; but if they are turned into the same meadows in the autumn, and especially if they are at all overstocked, they are almost sure to perish. The sheep may be turned into luxuriant pasture at any season of the year, and almost in any weather, and very few of them will become diseased. The surface of the ground is protected by the quantity of the herbage, and although there may be moisture beneath, the air has not free access to the roots of the grass, and the process of decomposition either is not yet up, or proceeds languidly. Let, however, this luxuriant pasture be eaten bare, and the weather and the state of the soil be favourable—the one damp and the other tenacious—and the fatal malady will not be slow in making its appearance. So in a rotting year, if the land is understocked, and thus the ground remains protected by the herbage, the loss of the farmer will not be immense; but if the field is overstocked and, consequently, trodden down and poached, the rot will probably assume a most fatal character. If, in addition to the sheep, horses and cattle are taken in to graze, the land will be still more poached, and the disease still more prevalent. The grass is trodden down, broken, and destroyed by the weight of the animals; the water collects in the footmarks; and rot, dependent on the causes already stated, is a necessary consequence*.

It is an old observation that on all pasture that is suspected to be unsound the sheep should be folded early in the evening, before the first dews begin to fall, and should not be released from the fold until the dew is partly evaporated. Where the ground is well covered, the early or late folding can be a matter of little consequence so far as the production of the rot is concerned; but if it is bare, or wet, or spongy, it may easily be conceived that, while this additional moisture is on the ground, the process of vegetable decomposition may be accelerated, and more than the usual quantity of deleterious gas escape in combination with the aqueous vapour.

Floods in the latter part of the summer are generally precursors of considerable destruction from the rot. The meadows, when the waters clear away, must be in the highest degree dangerous. The grass at this time had begun to die, the outer leaves and some of the stalks were perishing,—they wanted only the agency of heat and moisture to run into perfect decomposition. The rain comes, and with it the summer's heat; and the decomposition is rapid, and the extrication of poisonous gases profuse. If the waters are not too deep, the sheep may remain in the meadows until the surface is denuded of water, and probably the heavy rains may for a very little while have rendered the upland pastures somewhat dangerous; but the moment the water returns to its natural bed, the sheep must be hurried from the destruction which would otherwise be their inevitable lot. "A rotting year of sheep," says the old proverb, "a dear year of corn." That is sufficiently plain: the midsummer flood, for the reasons just stated, must be destructive to sheep, while at the same time it injures and beats down the corn when the wheat is just in flower.

Once more, during a frost the sheep may be turned on the worst ground

* "There are many instances of farmers who, having for a number of years kept a limited quantity of sheep on their lands without rot in their flocks, have afterwards, on increasing their stock beyond a due proportion, sustained serious losses by that disease; and again, on their reducing their flocks to their original standard, the rot has ceased."—Quarterly Journal of Agriculture, June, 1835.

with impunity. Why? The surface of the ground is locked up, and no evaporation of any kind is or can be going forward; but a thaw presently succeeds, and then another frost, followed by another thaw—"Many a frost and many a thaw betokens many a rotten ewe;" so says another old proverb, and it will be sure to be verified. The frost has killed outright every plant that was beginning to decay, and the sun breaks out, and decomposition at once commences, and with it the work of death.

Then the mode of prevention—that with which the farmer will have most to do, for the sheep having once become decidedly rotten, neither medicine nor management will have much power in arresting the evil—consists in altering the character of as much of the dangerous ground as he can, and keeping his sheep from those pastures which defy all his attempts to improve them. The nature of the herbage and the character of the plants which the soil produces, have nothing to do with the development of the rot: it is caused simply by the extrication of certain gases or miasmata during the decomposition of vegetable matter, under the united influence of moisture and air. They are both indispensable. If all unnecessary moisture is removed from the soil, or if the access of air is cut off by the flooding of the pasture, no poisonous gas has existence, and the sheep continue sound. The farmer cannot always have his land under water; and the flooding, although it may remove the present evil, yet prepares for its return with accumulated destructive power; but he has the means of taking away the superfluous and dangerous moisture. In the majority of cases he may drain, and with comparatively good effect, almost every acre of suspicious ground upon his farm, and which he is desirous to devote exclusively or occasionally to his sheep. It may be an expensive mode of prevention, but it is the only one, and it is a sure one. If the expense is serious and more than he can well afford, he may leave a portion of his marsh land undrained, and on it he may turn his cattle. Yet he would not be altogether wise in doing this; for, although cattle are not subject to the rot, yet the worm in the air passages would destroy many of his young stock, and the older ones would suffer from moor-ill, and wood-evil, and rheumatism, and various other diseases, of far too frequent occurrence on marshy ground.

The kind of drainage that should be adopted is not a proper subject of consideration in this work. The farmer must adapt it to his means, his land, and the facilities which his situation may afford him. He must, however, take care that it is effectual. It would, perhaps, be going too far to say with Mr. Parkinson, and yet he is high authority on practical points, that "there would be no rotten sheep found even upon the most spongy land in the country, if it were properly drained;" and that "there being rotten sheep on inclosed lands is inexcusable*." There are seasons when what is called by the farmers *a jack rot* occurs—that is, a general prevalence of this disease. The rain does not fall sufficiently heavy to overflow the lower and most dangerous ground, but it continues long enough to render the upper and usually safe ground almost as wet and spongy as the other. It may, however, be safely affirmed that in a sheep country, and with dangerous ground in various parts of it, no money would be so profitably expended as that which was devoted to the drainage of the farm. "The farm on which I was born," says Mr. Parkinson, "at Aby Grange, was deemed so rotten, that the oldest inhabitants advised my father, when he took it, not to breed sheep, but to keep horses and cattle. The greatest portion was a poor, sour, hungry clay; so tenacious as to hold water in

* Parkinson on Live Stock, vol. i. p. 419.

most parts like lead, but when drained properly, I question if there was a sounder farm in the kingdom. Even during the year when nearly all the sheep in the neighbourhood were rotten, my father lost but seven out of four hundred on the farm *."

Much land, however, on the drainage of which considerable money has been expended, continues, occasionally at least, to rot the sheep that are turned on it. In the first place it may be doubted whether the drainage has been perfect—sufficiently deep, with sufficient fall, and the branches sufficiently close—whether in some of the most important parts obstruction has not occurred, and the water has accumulated under the superficies of the soil; and last, but not least, whether there have not been some corners, that have been overlooked, or some, and perhaps very small, spots which the drains could not affect. It is not every drained sheep-farm that could bear a scrutiny like this. In some of the best fields, perhaps, there would be found one or two little puddles, or swampy spots—not a few readers of this work may, perhaps, recollect that there is an absolute pond here or there: the soil is dry and sound enough, and on account of that they have overlooked the pond, although the borders of it bear coarse grass, and are not a little swampy. The existence of places like these may cause the destruction of scores of sheep; and where the business of drainage is going forward, they may render all the labour and expense bestowed on the other parts altogether fruitless. There is nothing that more requires minute care and attention on the part of the farmer, or where that minute care would be better repaid, than in the drainage of the suspicious portions of the sheep-farm. A drain here and there, and without proper calibre, or form, or outlet, will never accomplish the intended object. That which is here attempted should be "done, when 'tis done," or it may as well be let alone.

The account of *the treatment* of rot must, to a considerable extent, be very unsatisfactory. Let it be supposed that, late in the summer or autumn, the farmer begins to suspect that the rot is got among his sheep. If he is a careful observer—if he or the shepherd looks the flock diligently over every morning, the malady may be detected at its very commencement. The serous injection of the eye, the paleness of the vessels of the eye, and of the skin, and the dulness of the sheep, will give sufficient indication. Let it be supposed that the attack is just commenced. What is the condition of the sheep; the distance from the market, and the market price? If the sheep are in good marketable condition, is it not best to dispose of them at once? or, if this is actually the beginning of the disease, shall he try, for a little while, to improve that condition? It is one of the characters of the rot to hasten, and that, to a strange degree, the accumulation of flesh and fat. Let not the farmer, however, push this experiment too far. Let him carefully overlook every sheep daily, and dispose of those who cease to make progress, or who seem to be beginning to retrograde. It has already been stated that the meat of the rotted sheep, in the early stage of the disease, is not like that of the sound one; it is pale and not so firm: but it is not unwholesome, and it is coveted by certain epicures, who perhaps are not altogether aware of the real state of the animal. All this is matter of calculation, and must be left to the owner of the sheep; except that, if the breed is not of very considerable value, and the disease has not proceeded to emaciation or other fearful symptoms, the first loss will probably be the least; and if the owner can get anything like a tolera-

* Parkinson on Live Stock, vol. i. p. 425

ble price for them, the sooner they are sent to the butcher or consumed at home the better.

Supposing, however, that their appearance is beginning to tell tales about them, and that they are too far gone to be disposed of in the market or consumed at home, are they to be abandoned to their fate? No; far from it. No very sanguine expectations must be formed of a cure; but many more cures would be effected than are reckoned upon, if the farmer would throw off some of his fatalism, and bestir himself in good earnest in the affair. There are many veterinary surgeons now finding their way into various parts of the kingdom who would render good service here; and those agriculturists would deserve well of their country who demanded the establishment of a school the instructions given in which embraced the maladies of every domestic animal.

If the farmer slaughters many sheep for the consumption of his family, or if he will listen to the testimony of the butcher, he will be assured that several of those that had been tainted by the rot have recovered their full health and condition without medical assistance—with no assistance from the farmer, except change of pasture—and often with no assistance at all but the renovating power of nature. The scars in every part of the liver in the neighbourhood of the gall-ducts, the shrunken appearance of the liver at these spots, its generally diminished size—these circumstances will be sufficient to assure him that although the flock attacked by the rot, and neglected from supineness or abandoned in despair, will usually become sadly diminished in its numbers, the case is not so desperate with him who is resolved to discharge the duty which he owes to himself and his flock.

If it suited the convenience of the farmer, and such ground were at all within reach, the sheep should be sent to a salt-marsh in preference to the best pasture on the best farm. There it will feed on the salt encrusted on the herbage, and pervading the pores of every blade of grass. A healthy salt-marsh permits not the sheep to become rotten which graze upon it; and if the disease is not considerably advanced, it cures those who are sent upon it with the rot. "The rot," says Mr. Price, in his treatise on sheep, "is a disorder which has not fallen under my own observation, for the sheep in Romney Marsh have never been affected by it during the seventeen years that I have resided in this district, though they are regularly allowed to feed on the wettest spots. But *in the memorable rotting year*, after an unprecedented continuance of wet weather, the sheep in the marsh were equally subjected to it as in other places."

What kind of pasture are the sheep at present occupying? Is there the slightest suspicion of taint about it? Will the farm afford a dryer, a sounder, and a better? Let them have it without delay—let the most valuable of them be still better taken care of—let them be driven to the straw-yard, or some more sheltered place. By these means let the supply of any more of the poison be effectually cut off; then carefully examine every individual in the flock. Are there any indications of fever—heated mouth, heaving flanks, or failing appetite? Is the general inflammation beginning to have a determination to that part on which the disease usually expends its chiefest virulence? Is there yellowness of the lips and of the mouth, of the eyes and of the skin? At the same time are there no indications of weakness and decay? Nothing to show that the constitution is fatally undermined? Bleed. Abstract, according to the circumstances of the case, eight, ten, or twelve ounces of blood. There is no disease of an inflammatory character at its commencement which is not benefited by an early bleeding. To this let a

dose of physic succeed—two or three ounces of Epsom salts, administered in the cautious manner so frequently recommended; and to these means let a change of diet be immediately added—good hay in the field, and hay, straw, or chaff in the straw-yard.

The physic having operated, or an additional dose, perchance, having been administered in order to quicken the action of the first, the farmer will look out for further means and appliances. Friction with mercurial ointment on the region of the liver has been recommended, but not by those who have had opportunity to observe its secondary effects on the ruminant. It is used, but then cautiously, and very much lowered, in order to cure the scab, or other violent cutaneous eruptions, and it must be used cautiously—it must be carefully watched, or, to speedy salivation will be added the breaking up of the whole strength of the constitution. Still the disease under consideration, with evident determination to the liver, requires the agency of this powerful but dangerous medicine. Two or three grains of calomel may be given daily, but mixed with half the quantity of opium, in order to secure its beneficial, and ward off its injurious, effects on the ruminant.

To this should be added—a simple and a cheap medicine, but that which is the sheet-anchor of the practitioner here—common salt. Many quack medicines have been obtruded on the public for the cure of rot, and wonderful stories have been told of their good effect. It cannot be denied that some of them have been useful; but they have been indebted for most of their salutary power to the salt which they contained, and which the farmer can procure at far less cost, and separated from those deleterious stimulants which, whatever may be their effect in protracting the disease when the powers of life begin to fail, are altogether out of place at the commencement of the complaint.

The farmer is beginning to be aware of the valuable properties of salt in promoting the condition, and relieving and preventing many of the diseases of all the domesticated animals. In the first place, it is a purgative, inferior to few, when given in a full dose; and it is a tonic as well as a purgative. Its first power is exerted on the digestive organs—on the stomach and the intestines—augmenting the secretions, and quickening the energies of each. It is the stimulus which Nature herself points out, for, in moderate quantities and mingled with the food, men and beasts are fond of it*. A mild tonic, as well as an aperient, it is plainly indicated

* In the Quarterly Journal of Agriculture, vol. II., p. 579, is a valuable essay by the Rev. B. Dacre, on "The uses of Salt as a Condiment for Domestic animals." A few passages are extracted from it with reference to sheep. Lord Somerville was among the earliest who introduced into England the practice of giving salt to sheep. He purchased a flock of Merino sheep, which he brought to England; and as they had been accustomed to have salt in Spain, he continued to give it to them when he brought them to this country, and he also placed it before his other sheep. He was now residing in the rich vale of Taunton, but afterwards removing to a light dry sandy soil in Surrey, and salt being then very heavily taxed, he discontinued its use. For several successive years he lost many of his young sheep, which he was afterwards inclined to think might have been saved, had he continued to give them salt: he therefore reverted to his former practice, and with the desired success. He gave more in autumn and spring, when the dews are heavy, than in summer and winter; and his annual consumption was about one ton to a thousand sheep. It was placed on flat stones at a certain distance from each other in their pasture.

Mr. Curwen recommends the practice of giving salt to sheep very strongly. He gave 4 oz. every week, except that while the sheep were feeding on turnips or other succulent food, they had as much as they chose to eat.

Arthur Young advocated the practice of giving salt to sheep, and says that "it is remarkable that this custom should be adopted in almost every country in the world, England excepted. It certainly tends to keep any flock healthy; and if the land is

soon after the commencement of the rot. The doses should be from two to three drachms, repeated morning and night. When the inflammatory stage is clearly passed, stronger tonics may be added to the salt, and there are none superior to the gentian and ginger roots; from one to two drachms of each, finely powdered, may be added to each dose of the salt.

The hay, if any is allowed, should be plentifully sprinkled with salt. The sheep will be induced more readily to take it; when, otherwise, the remembrance of their green food might cause them either to eat sparingly of it, or to refuse it altogether *.

The use of salt, for general purposes, is no new recommendation. Some of the most ancient Greek writers on agriculture have spoken of it in the strongest terms, but it has never been valued so much as it ought, and in the rot its triumph is most signal and certain.

The sheep, having a little recovered from the disease, should still continue on the best and dryest pasture on the farm, and should always have salt within their reach. The rock salt will be the most convenient, and the cheapest, considering the wasting and melting of the common salt; and if it should be necessary, on account of the arrangements of the farmer, again to place them on suspicious ground, the allowance of salt should be ample, or, in fact, unlimited†.

wet or moist, or otherwise unfavourable, the evil may be considerably remedied by the practice of giving salt. The sheep should have as much salt as they will eat."

All three of these gentlemen recommend it as a preservative against the injurious effects of moist or wet pastures on which it may be required for sheep to graze. Without the free use of salt, they cannot be long kept on strong wet retentive soils, but when salt is placed in the way of the sheep a great portion of the hazard is removed.

Sir John Sinclair, in his "Agricultural State of the Netherlands," says that at Mr. Mosselman's farm, at Chenoi, beyond Wavre, he found that salt was used for sheep, and that by allowing them to lick it the rot was completely cured.

Mr. Bracebridge of Walton-on-Thames was induced to drench with strong brine, morning and night, some sheep that were affected with the rot: after which he did not lose one. They became fat, and the meat was as fine and good as if they had never been affected.

Mr Charles Adams, a writer in the Farmer's Journal, has given salt to sheep and lambs in all cases of diarrhœa, and with the greatest success. "This is a subject," adds the author, "which any one may put to the test. It may be done by the farmer with his thousands of sheep, his herds of cattle, his teams of horses, and his well stocked piggery; and it may be as profitably practised by the carter who has only one horse, the villager with his single cow, and the cottager with his pet ewe, or solitary hog."

* "That dire distemper sometimes may the swain,
Though late discern; when on the lifted lid,
Or visual orb, the turgid veins are pale.
The swelling liver, then her putrid store
Begins to feel. Ev'n yet thy skill exert,
Nor suffer weak despair to fold thy arms:
Again detersive salt apply, or shed
The hoary medicine o'er their acid food."

Dyer's Fleece, Book I.

† A short sketch of the history of the rot, as connected with the overflow and subsidence of the waters of the Nile, will be strongly illustrative of the theory of the disease here adopted, and will, in other respects, be interesting to the sheep-breeder. It is condensed from the account given by M. Hamont, the founder of the veterinary school in Egypt. "It appears every year in Egypt after the fall of the Nile, and it follows and keeps pace with the subsidence of the waters. Desolation and death accompany it wherever it passes, and it annually destroys at least 160,000 sheep. As soon as the waters of the Nile begin to subside, the pastures which were submerged are speedily covered by a tender rushy grass. The sheep are exceedingly fond of it, and they are permitted to feed on it all day long. In the course of a very little time they begin to get fat, when, if possible they are sold. Their flesh is then exceedingly delicate; but soon after this the disease begins to appear, and the mortality commences. The disease is more frequent

It does not appear that one sort of sheep is more liable to the rot than another, but the heavy breeds of sheep, requiring more abundant and grosser food, are oftener placed in situations liable to engender the rot*.

After the account which has been given of the nature and treatment of the rot, the questions as to the infectiousness, or hereditary character of the disease are readily answered. No one who is in the slightest degree acquainted with the subject could for one moment suspect it to be infectious. It results from the breathing of these injurious gases, and from nothing else. Even the previous condition of the animal seems to have little influence in causing or preventing it. As to hereditary predisposition, that too is altogether out of the question. The rot is produced by a cause of merely temporary influence and power. How far, however, it may be prudent to breed from animals that have been affected by the rot is another question. The rot cannot be produced in the offspring by any taint that may be derived from the parents,—but the general debility which this malady leaves behind it, and the predisposition to disease of certain viscera, and particularly of the liver, from causes that would scarcely affect other sheep,—there is much in this which deserves the serious consideration of the farmer. He will probably conclude that a sheep that has recovered after an attack of this fatal malady should be consigned to the butcher as soon as he is in marketable condition, and that it would be imprudent to breed from any animals that had been attacked by the rot.

One circumstance should not remain unmentioned—it is so with many other diseases, both in the human being and the brute, and it is a wise and kind provision of nature—the ewe with a lamb by her side possesses, with a very few exceptions, an immunity from infection, even on the worst ground†.

The following cut represents the intestines of the sheep in their natural as they are seen on opening the belly.

1, Is the duodenum, or first small intestine, tied at its commencement from the fourth stomach.
2, The jejunum.
3, The ileum
4, The cæcum.
5, The larger portion of the colon.

and fatal when the sheep are first turned on the newly recovered pasture, than when the ground becomes dried, and the rushy grass harder. The sheep pasture in the midst of the mud, or on the borders of the marshes and canals, the rot attends every step. The rot does not occur in elevated countries, and where the sheep feed on dry aromatic herbage. The Bedouins do not fear it while their cattle feed upon succulent healthy plants, among the sands, and upon which a portion of salt is usually found; but if they are forced to encamp on the borders of lakes and canals, they are immediately attacked by the disease, but which again disappears when they return into the desert.

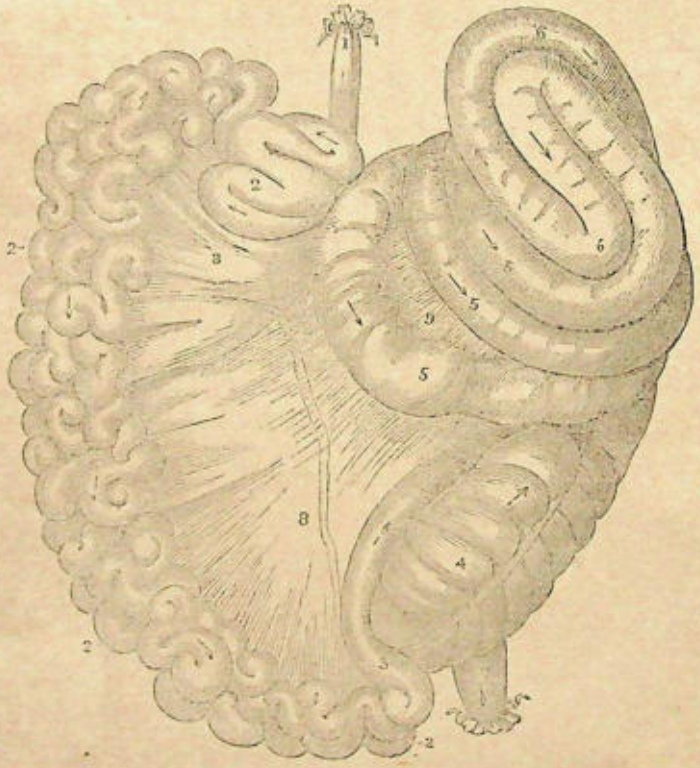
"The Bedouins sell all the sheep which they can before they quit the Nile, for they are in high and prime condition; after which they lose not a moment in re-assembling their flocks, and driving them back to the desert. In the midst of the sands their principal food is the salt-wort or kali. After some days the symptoms of the rot gradually disappear, and the sheep regain their former health. If the disease is much advanced this simple mode of treatment probably is not sufficient. The Bedouins themselves acknowledge it, and immediately destroy the animal."—Veterinarian, vol. vii. pp. 537 and 587.

If this history had been expressly written for the purpose, it could not have been more confirmatory of the theory of the rot as proceeding from the decomposition of vegetable substances.

* Letter from Mr. Kirkpatrick.

† The author has received a letter from Mr. Weeks, V.S. at Salisbury, confirmatory of this fact, on a farm belonging to that gentleman, in the neighbourhood of Salisbury, and very subject to the rot.

6, The convolutions of the colon as they tend towards the centre.
7, The returning convolutions of the colon.
8, The rectum or last intestine.
9, The mesentery, or portion of the peritoneum which retains the different intestines in their respective situations.
10, 11, The portions of the mesentery supporting the colon and rectum.



THE DUODENUM.

All the intestines are composed of four coats or layers, as in the horse and cattle. The outer or peritoneal one is formed of that membrane by which every portion of the belly and its contents is invested, and confined in its natural and proper situation. It is highly smooth and polished; and it secretes a watery fluid which contributes to preserve that smoothness, and to prevent all friction and concussion during the different motions of the animal. The second is the muscular coat, by means of which the contents of the intestines are gradually propelled from the stomach to the rectum, thence to be expelled when all the useful nutriment is extracted. The muscles, as in all the other intestines, are disposed in two layers, the fibres of the outer coat taking a longitudinal direction, and the inner layer being circular; an arrangement different from that of the muscles of the œsophagus, and in both beautifully adapted to the respective functions of the tube. The submucous coat comes next: it is composed of numerous glands, surrounded by cellular tissue, and by which the inner coat is lubricated, so that there may be no obstruction to the passage of the food. The mucous coat is the soft villous one lining the intestinal cavity. In its healthy state it is always covered with mucus, and when

the glands beneath are stimulated, as under the action of physic, the quantity of mucus is increased; it becomes of a more watery character; the contents of the intestines are softened and dissolved by it, and, by means of the increased action of the muscular coat, which, as well as the mucous one, feels the stimulus of the physic, the fæces are hurried on more rapidly, and discharged.

The food being dissolved by the action of the gastric juice in the fourth stomach, and converted into chyme, is propelled by little and little into the duodenum. There, as already described, by means of, or assisted by the bile and the pancreatic juice, it is changed into *chyle*, or the separation between the nutritive and fæcal parts commences. A new process is then observable, beginning to appear on the inner coat of the duodenum, most numerous along the jejunum and the ileum, and not entirely ceasing in the cæcum and colon, are certain minute small vessels, called *lacteals*, from the colour of the fluid which they carry. They open on the mucous coat of the intestines: in a healthy state they take up the nutritive portion of the food as fast as it is separated, and by a mode, to be hereafter described, convey it to the thoracic duct in order to be mingled with, and supply the waste of, and be converted into, blood.

The duodenum in the sucking lamb contains a somewhat thick homogeneous mass of a milky yellow colour, and that is beginning, ere it passes out of this intestine, to assume a darker hue. In the grazing sheep the mass is thicker and more opaque, and of a yellow-brown colour, with a few mucous transparent particles floating in it: these are the portions of the nutritive matter beginning to separate. The fluid is still of a decidedly acid character, and changes a vegetable blue colour to red. In a sheep, however, fed on hay and corn, it has an alkaline character; the alkali of the bile has more than neutralized the acidity of the chyme. Albumen also begins to appear in this intestine in a considerable quantity, and a caseous matter is here seen—the product partly of a secretion from the coat of the intestine, and also furnished by the pancreatic fluid.

The great length of the intestines of the sheep—twenty-seven times that of the animal—renders it unnecessary that there should be any transverse folds, as in those of most other animals, in order that the passage of the food may be delayed for the full extraction of its nutritive qualities. It can scarcely traverse the lengthened canal that exists in the sheep without this purpose being fully accomplished. There are a few transverse bands in the duodenum, for it is necessary that the food should be delayed there, in order that the chyme may be thoroughly mingled with the bilious and pancreatic fluids, and converted into perfect chyle.

This intestine participates in the inflammation or other diseases of the rest, but it seems to have few or no morbid affections peculiar to itself.

THE JEJUNUM AND ILEUM.

There is no marked division between the duodenum and the two longer portions of the small intestines. The place where the first ends and the others commence is not definable, except that it may be said to be where the transverse folds are no longer seen. The jejunum and the ileum are situated chiefly on the right side of the flank, and rest upon the right portion of the paunch. It is on this account that in cases of hoove the knife or trocar is plunged into the left flank, for there are no intestines that can possibly be wounded. They are formed into numerous spiral convolutions, for the purpose of delaying the passage of the food through them, and are curiously attached to the edge of the peritoneum, for the sake of support.

Considerable change takes place in the food as it passes through these intestines. The milk in sucking lambs becomes of a deeper colour, and of less consistence, and at the termination of the ileum has almost the character of orange-coloured mucus. The contents of these intestines in sheep that are fed on hay and grass are also changed; they are darker coloured and more consistent,—they have the appearance of a thick mucus of a dark brown-green colour, with vegetable fibres swimming in it, and a quantity of liquid fæces. The contents of these intestines have lost their acid character, and are become completely alkaline: they will effervesce with acids. This is probably owing to one or the other, or the whole of the following causes. The fluid secreted by the mucous membrane of the small intestine may be alkaline; or the food being all of a vegetable matter, some decomposition may necessarily take place in its passage through so long a canal, and the ammoniacal gas, disengaged, may neutralise the acid previously present; or the acid may be absorbed by the lymphatics, with the nutritive portion of the chyle. The albumen which the duodenum contained has nearly disappeared before it has reached the termination of the ileum. The caseous matter is also scarcely detectible here, and the nutriment is nearly extracted.

THE CÆCUM, COLON, AND RECTUM.

At the termination of the ileum is the opening into the cæcum and the colon. (Fig. 3, p. 462.) Some writers on comparative anatomy have said that the ruminant has no cæcum. It has not the complex and cellated structure of the same intestine in the horse, but it has the same general character: it is a blind pouch that the contents of the intestines have to traverse,—in which they are for a while detained,—and through which they are propelled contrary to their gravity. It is a kind of reservoir into which is poured a portion of the contents of the ileum, in order to undergo one of the latter stages of digestion, and perhaps the last of material importance, and in which the separation of the fæcal and nutritive matter is very considerably advanced. It seems to perform a somewhat different and more important function in the carnivorous animal, and even in the solipede than in the ruminant. In the former its contents again become acid; in the latter they retain their alkaline character, somewhat, indeed, diminished. An acid principle seems to be developed, but not sufficient to neutralise and overcome the alkali: there is also no development of albumen in the cæcum of the ruminant; of which more will presently be said. It is supplied with more numerous glands, and these of a larger size than are found in any of the other intestines; secreting, probably, a fluid intended to soften that portion of its contents which had hitherto escaped the powers of digestion. In it the last effort is made to extract from the different substances all the nutriment they can afford; and here the true fæcal appearance and smell are first perceived in that portion which is finally to be ejected.

Having reached the base of the cæcum (fig. 4, p. 462), the food is returned again, by the agency of the muscular coat of the intestine, and contrary to the power of gravitation, to the termination of the ileum, and the commencement of the colon. A valvular contrivance prevents it from again entering the ileum, and it finds its way to the colon. (Fig. 5, 6, and 7, p. 462.) This is proportionally a far longer intestine than in the horse, but it is comparatively as bulky. The singular manner in which it is convoluted in order to give room for its enormous length, and the manner in which it is imbedded into, and supported by the mesentery, are worthy of observation.

It, like the colon of the ox, is free from the bands without, and the cellated structure within, which distinguish the colon of the horse. The portion of the colon in the sheep which succeeds to the cæcum contains a thick and brown mass, of greater consistence than in the cæcum. As it proceeds it becomes still harder, and at length begins to form itself into little globular masses composed of vegetable fibres, a flocculent mucus, and many of the principles which constitute the bile. This fæcal substance has now attained a neutral character, the ammonia being combined with carbonic acid in excess.

The small portion of nutriment which the contents of the colon may still possess is extracted in that division of it which is nearest to the ileum: after that the chief or almost only use of these intestines in the sheep is to take up the liquid matter that yet remains, and to form and harden, and retain for a while, and finally to expel the residuum.

SHEEP'S DUNG—FOLDING.

Sheep's dung is valuable for manure, and for some other purposes. It has been supposed, and probably with truth, that it contributes more to the improvement of the land than does the dung of cattle. It contains a greater proportion of animal matter, and that condensed into a smaller compass; and it falls upon the ground in a form and manner more likely to be trodden into and incorporated with it, than the dung of cattle. Hence arose the system of folding sheep on the arable part of a farm in many districts in the midland and southern parts of England. The sheep were penned on a small space of ground, and the pens being daily shifted, a considerable quantity of land was ultimately manured. In Norfolk, where the system was more than usually prevalent, it was considered to be a valuable point with regard to the sheep, that they might be driven to a considerable distance in order to be folded. Marshall, in his "Survey of Norfolk," enters into a calculation of the advantage derived from the sheep-fold. Other manure would cost, including the value of the dung and the cartage, at least 50*s.* per acre. A hundred sheep would fold nine acres in the course of a year, amounting to 22*l.* 10*s.*, or 4*s.* 6*d.* a-head. The dung and the urine, and, according to some persons, the oil and perspiration from the wool, would render this dressing equal to any other that could be bestowed upon it.

On the other hand, it is certain that the sheep must suffer in some degree from being driven a mile or two to the fold morning and night, and having their hours of feeding and of rest controlled. The sheep that are so folded do not fatten so well as others, on account of this additional labour, and on account likewise of the unnecessary exertion during the day, when, collected in large bodies, they are struggling for the lead. The system of folding, therefore, is not so much practised as it used to be on arable land, although often highly beneficial in an uninclosed or down country, and more particularly advantageous, when the sheep are turned on turnips, clover, tares, or other rich food, for they feed at their ease, and manure the land at the same time.

Sheep's dung is much used by the Scottish and Irish peasantry in the cleaning of the wool previous to its being dyed. The woollen goods are supposed to acquire a peculiar intensity and brilliancy of colour when thus prepared. It is much used in France and Germany, and to a considerable degree in England, in preparing cotton and linen for receiving certain colours. The albumen and gelatine of the dung are animal substances; the surface of the cloth is in some measure covered by them, and it is well

known that an animal substance will receive a brighter colour and retain it longer than a vegetable one. The Indian red, madder, and crop-wort, afford a dye in which it is particularly necessary to prepare the cloth by means of sheep's dung. Other albuminous preparations will doubtless ere long be substituted.

ACUTE DROPSY, REDWATER.

In treating of the diseases of the belly of the sheep it will be natural first to consider those of the enveloping membrane of the intestines. It is strangely subject to acute inflammation. In the autumn, or commencement of winter, when sheep are beginning to feed on turnips, or other succulent food, the shepherd will perhaps look over his flock in the evening, and perceive nothing amiss with any of them; but on the following morning one or more of them will be found dead. They will be lying nearly in the usual posture, the legs bent under them, and the head protruded: there has not been any severe struggle,—but they are dead—and on examination the belly contains a greater or less quantity of bloody fluid, and the peritoneum, and especially the mesenteric and omental portions of it, is highly inflamed. Often a change of pasture, and especially from a dry to a cold and wet one, and especially if there is much hoar frost, will be as destructive as an inconsiderate change of food. The animal becomes chilled by this sudden change of situation. The belly coming most in contact with the damp and cold ground is first affected; the peritoneal coat of the intestines becomes chilled—re-action, inflammation, soon follows—its natural function, the secretion of a fluid to lubricate the cavity of the belly is morbidly and strangely increased—the fluid accumulates, and it is red and bloody from the rupture of the small vessels of the peritoneum distended by inflammation. The inflammation pursues its course with almost incredible rapidity, and the animal is destroyed. The losses of the farmer in the autumn and winter are often exceedingly severe from this disease. It is generally termed *redwater*, naturally enough from the colour of the fluid with which the belly is filled; yet there being an objection to the term from the possibility of its being confounded with the discharge of red-coloured urine, to which the sheep is likewise subject.

It is this disease which is so fatal among lambs soon after they are yeaned, when the farmer suffers them to lie about upon a moist and chilling soil. The difference between the temperature of the mother's womb and the cold air that is generally felt at yeaning-time is a sufficient cause of hazardous disease, without the sheepmaster aggravating the danger by incautiousness and inhumanity.

It is probable that no blame may attach to the shepherd on account of his not observing any previous illness, for the progress of the disease is often almost incredibly rapid. It is an instance rarely occurring in the practice of the human surgeon, but very interesting to him, of the rapidity with which this product of inflammation may accumulate in the belly.

In some cases, however, there will be warning of the commencement of the disease. The sheep will lag behind, or separate himself from the flock, or stand with his head protruding, or begin to breathe with difficulty, and the enlargement of the belly inducing suspicion of the real nature of the case. Before the effusion has much proceeded the animal will evince a great deal of uneasiness, lying down and getting up; sometimes rolling about; occasionally the mucous coat of the intestines sympathising with the peritoneal, and there being frequent watery stools, mixed with mucus and bile. Oftener, however, there will be obstinate constipation.

In the present imperfect state of our knowledge of the diseases of sheep, and when the symptoms, and the circumstances relating to food and situation, lead to the suspicion of the existence of this malady, the best advice that can be given to the farmer is immediately to slaughter the animal. If any medical treatment is adopted, it must consist of bleeding to a very considerable extent—the administration of purgatives—the change of pasture, or the substitution of more wholesome food.

As for that species of dropsy which is the consequence of debility, or the result of various diseases, it is usually past all cure. It is the almost invariable accompaniment of the rot in its last stages: it follows acute inflammation of the liver, and chronic peritoneal inflammation; it is a symptom, scarcely to be mistaken, of the breaking up of the constitution.

It is a disease very common among old sheep, and at the end of the autumn or the beginning of the winter. Its earliest symptom is swelling of the legs towards night, swelling under the jaw, loss of flesh and strength and spirits; then enlargement or hanging down of the belly, and at length, the detection of the water, by striking the belly with one hand while the other is held firmly on the opposite side.

Gentle purgatives, mingled with tonics—the Epsom salts, with gentian and ginger—little watery food, and a liberal allowance of hay and corn, will be the only restoratives. The evacuation of the fluid by the use of the trocar should be entrusted to no one but a veterinary surgeon, and will very rarely afford permanent relief. If the system cannot be sufficiently restored to cause the re-absorption of the effused fluid, the relief by tapping will be temporary and delusive.

DISEASES OF THE SMALL INTESTINES.

There is sometimes reason to suspect the existence of *colic* in the lamb, especially in the one that is unnaturally forced on for the winter house-lamb market by being crammed with the milk of a foster-mother besides that of his own, and occasionally cow's milk added to the other two. The uneasiness of the animal, the moaning, the getting up and lying down, the striking of the belly with the hind foot; these are indications that his over-irritated bowels are labouring under spasmodic action, and which common sense would say must be the necessary result of such a system of feeding.

The grass lamb, taken from the guidance and tuition of its dam, and feeding on acrid and half-poisonous as well as wholesome herbage, is subject to the same affection of the bowels. In the majority of cases, an aromatic purgative will be all that will be required, such as an ounce of Epsom salts, with a couple of drachms of ginger and a scruple of the essence of peppermint. If the pain is not soon relieved, a second drink with double the quantity of the Epsom salts should be administered, and warm gruel forced on the animal, otherwise the colic may lead on to strangulation or inflammation.

This, however, is not a frequent complaint in the adult sheep, for the food has been, by the apparatus of the four stomachs, and the process of rumination, effectually prepared for rapid and perfect digestion.

STRANGULATION

is for the same reason a state of the bowels not often to be expected, and not often occurring. The manner in which the small intestines are convoluted at the termination of the mesentery would show that it is a disease that might be easily set up, but the exciting cause—the presence of acrimonious and indigestible substances in the intestines—is wanting. That

species of entanglement of the intestines known under the name of *Cords* or *Gut-tie* in oxen has not yet been observed in sheep. No author has hinted at it in this animal, nor has it come under the cognisance of the author. It is fair to suppose that the symptoms would be the same as those of a like disease in cattle, and which are described at page 490 of the work on Cattle.

Introsusception of the intestine is a disease doubtless occasionally existing in the sheep, but never yet described or observed. The close attachment of the intestines to the mesentery would prevent its existing to any considerable extent, even in the small intestines; and in the colon it is altogether impossible. The farmer and the veterinary surgeon are in a state of lamentable deficiency with regard to the intestinal complaints of this animal.

ENTERITIS.

By this term is understood inflammation of most, if not all, of the coats of the intestines. To this disease the sheep is undeniably subject, but the number of its victims is not so great as some persons imagine. Its early symptoms are not to be distinguished from those of colic: possibly it is simple colic which then exists; but the disease does not yield to common remedies. The symptoms continue—they become more aggravated—the animal stamps the ground with his feet—he scratches it—he attempts to strike his belly with his hind legs—he bends his knees as if he would lie down, but he dreads the pain resulting from the consentaneous action of the muscles of the belly, and their pressure on the contents of the belly; he looks round at his sides: at length he comes suddenly down—he rolls on his back:—he maintains this position for some seconds, and then he suddenly starts and scrambles up again. The muzzle, the horns, and the feet are cold. The pulse is quick but small—the bowels are usually confined—obstinately so—the strength of the animal rapidly wastes away. Sometimes there is a determination of blood to the head; the animal is heedless of all around it, the pupil is widely dilated—and to this delirium occasionally supervenes.

The unnatural and spasmodic action of the bowels leads on to strangulation, introsusception, hernia, rupture—effusion in the abdomen. The appearances after death are intense inflammation, not so much of the mesentery or the omentum—perhaps little or none at all; but of the peritoneal coat of the intestines themselves—sometimes of the small intestines, at other times of the larger ones, and often involving the whole extent of both. This is accompanied by effusion, not so bloody as that in peritonitis, nor in so great quantity, but varying from an almost clear fluid to a dark purulent matter—agglutination together of certain portions of the intestines—the formation of false membranes, and gangrene of the bowels, both within and without. The inflammation sometimes extends from the cæcum to the abomasum, and occasionally involving the other three stomachs—the liver being also inflamed and much enlarged.

The causes belong almost exclusively to the food or the locality. Enteritis is produced by stimulating and acrimonious nutriment—by an excess of that which is healthful—by the injudicious administration of purgatives, by exposure to cold, and, more particularly, by the mingled influence of cold and wet.

The treatment is sufficiently plain—bleeding according to the age and condition of the animal, and the urgency of the symptoms—purgatives perseveringly administered until the bowels are opened, and the purging being

afterwards kept up; the Epsom salts being employed to produce the first effect, and sulphur the second. The food to consist of mashes or gruel. No tonic to be allowed until the febrile stage is passed, or until violent diarrhœa, difficult to check, has succeeded to the constipation.

DIARRHŒA.

If these affections of the external coats of the intestines do not frequently occur, inflammation of the inner or mucous membrane is the very pest of the sheep. When it is confined principally to the mucous membrane of the small intestines, and is not attended by much tenesmus or fever, it is termed *diarrhœa;* when there is inflammation of the large intestines, attended by fever, and considerable discharge of mucus, and occasionally of blood, it is *dysentery*. These diseases are seldom perfectly separate, and diarrhœa is too apt to degenerate into dysentery. The diarrhœa of lambs is a dreadfully fatal disease. If they are incautiously exposed to the cold, or the mother's milk is not good, or they are suckled by a foster-mother that had yeaned too long before, a violent purging will suddenly come on, and destroy them in less than twenty-four hours.

When the lamb begins to crop the grass at his mother's side he is liable to occasional disturbance of the bowels; but as he gains strength, the danger attendant on the disease diminishes. At weaning-time care must sometimes be taken of him. Let not, however, the farmer be in haste to stop every little looseness of the bowels. It is in these young animals the almost necessary accompaniment or consequence of every change of diet, and almost of situation; and it is frequently a sanative process: but if it continues longer than four-and-twenty hours—if it is attended by pain—if much mucus is discharged—if the appetite of the animal is failing him in the slightest degree, it will be necessary to attend to the case. The medicine is that which is sold under an expensive and not always genuine form by the name of the "Sheep and Calves' Cordial." The best way of compounding it is the following: take of prepared chalk an ounce, powdered catechu half an ounce, powdered ginger two drachms, and powdered opium half a drachm; mix them with half a pint of peppermint water. The dose is from one to two table-spoonfuls morning and night.

Should the purging prove obstinate, it will be advisable to remove the lamb from the mother, for her milk is probably not good. The milk of another ewe may not be procurable without difficulty, it will therefore be generally expedient to have recourse to the milk of the cow, which should be boiled; the Calves' Cordial being continued as before, and good care and nursing being never forgotten while the animal labours under this disease.

The diarrhœa of lambs is, in a great majority of cases, attributable to the carelessness or mismanagement of the farmer, either referrible to deficient or improper food or the want of shelter at an early age: as the animal grows up he is better able to struggle with the disease.

Diarrhœa occasionally attacks the full-grown sheep, and is too often fatal, especially when it has degenerated into dysentery. It is very common in the spring, and particularly in the early part of the season, when the new grass begins rapidly to sprout. Here, still more decidedly than with the lamb, the sheep proprietor is urged not too suddenly to interfere with a natural or perhaps beneficial discharge; and after which the animal often rapidly gains condition. Four-and-twenty hours should pass before any decisive step is taken; but if the looseness then continues the sheep should be removed to shorter and dryer pasture, and hay should be offered to them, if, after hav-

ing tasted of the fresh grass of spring, they can be induced to touch it: a dose or two of the Sheep's Cordial may also be administered with advantage. The looseness not abating, and especially the symptoms of dysentery which have been just described, appearing, another course must be pursued.

DYSENTERY.

The careless observer would not always mark the difference between diarrhœa and dysentery; they are, however, perfectly distinct in their seat, their nature, and their consequences. Diarrhœa is often an effort of nature to expel from the intestinal canal something that offends. It may be only increased peristaltic action of the bowels, increased secretion from the mucous glands, and accompanied by little inflammation and less danger. It is, at first, an affection of the small intestines alone; but it may extend through the whole alimentary canal, and inflammation, which is not a necessary part of it, appearing, and increasing, general fever may be excited, attended by considerable danger. Dysentery is essentially inflammation of the large intestines—the result of neglected or obstinate diarrhœa, or altogether distinct from it—the consequence of unwholesome food—of being pastured on wet or ill-drained meadows—and of being half-starved even there. Fever is a constant attendant on it in its early stages, and wasting and debility rapidly follow.

The discharge of dysentery is different from that of diarrhœa. It is thinner, and yet more adhesive. A great deal of mucus mingles with it, which causes it to cling to the wool of the tail and the thighs; and there it accumulates, layer after layer—a nuisance to the animal, a warning to the owner of much danger, and that near at hand. When this kind of evacuation has been established but a little while, the next warning will be loss of flesh, and that to an extent that would scarcely be deemed credible. The muscles of the loins will all waste away; it is a living skeleton on which the owner puts his hand when he examines the state of the patient. Sometimes the animal eats as heartily as ever; at other times the appetite utterly fails. The continuance of the disease, or the time which is requisite in order to wear the animal quite down is uncertain. Dysentery occasionally carries off its victim in a few days; but frequently the miserable-looking patient struggles with its enemy for five or six weeks, and dies at last.

It is only lately that the proper treatment of this malady has been recognised. In every case of acute dysentery, and whenever fever is present, bleeding is indispensably requisite; for this is essentially a disease of inflammation. Physic should likewise be administered, however profuse the discharge may be; for it may carry away some of that perilous stuff which has accumulated in the large intestines, and is a source of fearful irritation there, and it will tend to lessen the general fever which accompanies this stage of the malady. The sheep must be removed from that situation and food, which perhaps excited, and certainly prolong and aggravate the complaint. Mashes, gruel, and a small quantity of hay, must be given.

Two doses of physic having been administered, the practitioner will probably have recourse to astringents. The Sheep's Cordial will supply him with the best; and to this tonics may soon begin to be added—an additional quantity of ginger may enter into the composition of the cordial, and gentian powder will be a useful auxiliary. With this—as an excellent stimulus to cause the sphincter of the anus to contract, and also the mouths of the innumerable secretory and exhalent vessels which open on the inner surface of the intestine—a half grain of strychnine may be combined.

If, as will happen in many cases when the malady is properly treated at

the commencement, and occasionally when it is not attacked until late in the day, the purging diminishes, the medicines must not be too soon discontinued. Many a sheep is lost on account of the impatience of the owner or the practitioner. Smaller doses should be given for three or four days; and, even then, the patient must not be consigned to his former pasture, but turned out for a few hours during the day, and then driven home, or placed on a much shorter bite, and supplied with good hay at night.

One caution should be added, which would seem to be superfluous, were there not so many cases of strange inattention and carelessness on the part both of the master and the shepherd. The tenacious, sticky character of the dung, and its tendency to accumulate about the tail, have been described as some of the distinctive characteristics of dysentery. It does sometimes accumulate to such an extent, and especially in lambs from which the wool has never been cut, that the tail is glued down on the buttocks, and there is a total impediment to the passage of the fæces. This, called *pinding* by many of the shepherds, is sometimes mistaken for constipation, and purgative medicine is, with certain bad effect, administered. In other cases the animal has been destroyed by the continued obstruction, although he gave sufficient notice of the danger, by the uneasiness which he exhibited. This evil is mostly confined to sucking lambs, when the ewes are in high condition and the pasture luxuriant; but the older lambs, and even the wethers, have suffered from this cause.

In other cases the clotted wool is separated by the efforts of the animal, when it strains severely in attempting to evacuate the dung, and very considerable soreness, and, now and then, large wounds, are produced. Warm water and soap must be plentifully used, in order to cleanse the wool, or a portion of it, perhaps, must be cut away. Some powdered chalk should then be sprinkled over the sores, or they may be dressed with lard, to which a few drops of spirit of tar have been added, and which will effectually keep away the flies.

CONSTIPATION.

The sheep occasionally suffers not only from this apparent costiveness, but from real constipation of the bowels. It is so with the lamb when the milk of the mother, either too great in quantity, or altered in quality, coagulates in the fourth stomach of the young one. When a lamb, in good condition, all at once becomes dull, unwilling to move, is panting, and evidently costive, there will be little doubt that the stomach is overloaded with milk. Many a lamb is thus lost to the farmer, and the fault is to be traced to the too luxuriant pasture into which the animal has been turned in order that he may be sooner ready for market. The author has seen three or four pounds of curd taken from the abomasum of a lamb thus destroyed.

Little good can be done in this case. The gently pouring down of plenty of warm water, with three or four ounces of Epsom salts dissolved in it, and this effected either with a long-necked bottle, or Read's Patent Pump, and thus dissolving and washing out the milk, will afford the best, and yet but little, prospect of cure. The lamb and the mother should be afterwards placed on shorter and drier pasture.

The full-grown sheep is occasionally costive, from the dryness of the pasture, or from some acrimonious herbs—also from the too plentiful use of hay and corn. The state of the fourth stomach in this case, and the means of cure that should be adopted, have already been stated.

Chapter XII.

THE ABSORBENT SYSTEM—THE LACTEALS.

From the inner surface of every part of the intestinal canal, and most numerous in the smaller intestines, vessels arise which have the property of taking up the chyle, or nutritious part of the food, as soon as it is separated from the fæcal matter. They are called *lacteals*, from the colour of the fluid which they convey. They are exceedingly minute, and each is furnished with valves, opening in a direction from the intestine, so that the course of the fluid which they contain shall either, by the pressure of the neighbouring parts, or some inherent power in the vessels themselves, flow in one direction only. A great number of the neighbouring lacteals unite, and form one tube, still of minute size; several of these unite, and form larger vessels; and countless numbers of them may be seen pursuing their course across the mesentery (fig. 9, p. 462). As they travel on they enter certain glandular bodies termed the *mesenteric glands* (fig. 9, p. 462), where the chyle undergoes some change, connected at least with its colour, for, after passing through them, it is considerably reddened.

Probably, however, more important changes than this have taken place. Having traversed these glands, the vessels, still more rapidly uniting together and becoming larger and fewer, at length terminate in a reservoir—a portion of the thoracic duct—called, from its office, the receptacle of the chyle. After this, as will presently be seen, the chyle, combined with the fluid returned by the absorbents, are mingled together, and flow on to the heart.

It is easy to see how intimately this process is connected with the healthy or unhealthy, the good or bad condition of the animal. The food may be such as cannot be converted into good and wholesome chyle. There is, in all probability, many a plant that would be diligently rooted from the pasture were the farmer acquainted with its deleterious properties, and were he botanist enough to detect its existence. Other vegetable productions, healthy stimulants of the digestive organs, might then be multiplied where either they have no existence or are not duly appreciated.

These vessels not only absorb the perfectly formed and wholesome chyle, but every thing that is not absolutely fæcal. How important is the warning derived from hence! It is chiefly the insoluble part of the food which is ultimately discharged in the form of dung; but that which in the process of maceration in the rumen, and more perfect mastication afterwards, and finally being subjected to the solvent power of the gastric juice, is capable, of being converted in this smooth and uniform fluid, will be taken up by the lacteals and carried into the secretion. The farmer appears to think that there is some power in the digestive organs to separate the good from the bad, in the fodder which he gives his sheep—the separation is between that which is soluble, and that which bids defiance to the power of the gastric juice. The good and the bad, if dissolved, equally enter into the circulation, and produce their natural and inevitable effects. The good and wholesome portion of the food may also be detained in the alimentary canal so long that it may become vitiated and poisonous, and in that state received into the circulation. All these things may sometimes be the cause of disease, and most certainly would aggravate disease of every kind already existing.

THE MESENTERIC GLANDS.

It has just been stated that the change which they effect in the chyle is not perfectly known: but it is well known that altered structure and particularly enlargement of them is connected with disease, and especially in young animals. No lamb dies either of chronic or acute disease in which the mesenteric glands are not found of double or treble their natural size; and, more especially, is enlargement of them invariably connected with consumption and tubercular disease. An increased size of these glands may be suspected when the belly is unnaturally large, and somewhat tender—when the lamb is losing flesh, and the bowels are irregular, and the appetite, far from being diminished, becomes voracious. It is difficult, however, to say what can be done, although the existence of the disease may be plainly demonstrated. Wholesome and nutritious food should certainly be given, and that more of a dry character than being succulent or watery. Gentian and ginger should be given in gruel with small doses of the "mercury with chalk," and Epsom salts with the same stomachics, if the bowels are confined.

THE LYMPHATICS.

These constitute another class of absorbents, deriving their name from the colourless fluid or lymph which they contain. They are similar in structure to the lacteals, and furnished with valves like them. They pervade or open upon every part of the body. From the closed cavities of the frame they absorb the superfluous fluid, or prevent it from accumulating beyond its healthy proportion or quantity—from every tissue, and every part, they carry away that which is worn out and useless. They are, like the lacteals, minute at their commencement—then uniting together from every neighbouring part, they form larger and still larger trunks; after this they pass through certain ganglions, or glands, in which the fluid which they carry undergoes alteration, and at length they terminate in the thoracic duct, or in some large veins in the neighbourhood of the heart.

Their connexion with disease needs little illustration. The lymphatics of the skin absorb from the surrounding atmosphere many injurious and some salutary agents. By means of them the scab runs like wild-fire through the whole flock, and the foot-rot spreads from sheep to sheep; and also, by their aid, we are enabled to counteract the destructive agency of other maladies. If contact with the unsound sheep, or with the part against which he has rubbed himself, will produce the scab, by the same channel is the remedy conveyed into the circulation. It is through the medium of the absorbents, and principally those of the lungs, or the respiratory passages generally, that the sheep contracts many a pneumonic disease, and that the rot itself is engendered; and it is by means of these absorbents that the pure air of the dry and upland pasture exerts such beneficial influence on the frame.

In the tumours which are occasionally found on sheep, we have an illustration of disease of the absorbents. From the irritation caused by coagulated, and perhaps unhealthy milk, inflammation is set up in the udder; the absorbents share in its inflammation; they become impervious, and the tumour of garget is produced. The practitioner endeavours to excite them again to action—he foments—he well rubs in a stimulating embrocation, and the tumour gradually decreases and disappears—it has been absorbed—the matter of which it was composed is taken up, carried into the circulation, and expelled, or the tumour undergoes a change of consistence—it

softens—it is changed to a purulent fluid—an abscess is formed, and the matter which it contains, if not evacuated, yet presently disappears. That too is absorbed—it is carried into the constitution: but it was unhealthy, it was putrid, and it contaminates every part over which it flows, and the animal, shortly afterwards, dies. There are plenty of illustrations of this in farcy in the horse. There is a fluctuating tumour or an abscess in some part; it is not sufficiently near the surface to be lanced, as the practitioner or the proprietor wishes to bring it *more to a head*, and he continues his poultices or other emollients. All at once the tumour disappears, and to that rapidly succeeds farcy. The purulent matter has been re-absorbed, and it has empoisoned the constitution. In garget in the sheep, if the abscess is deep in the indurated teat or quarter, the practitioner, instead of boldly plunging his lancet to the bottom of it, too often waits until the suppurative process is fully established; but ere this happens, the heat all at once diminishes, and the redness disappears—the shepherd thinks that all is right, and that a cure is effected; but symptoms not unlike those of the rot presently appear, and the belly swells, and the animal wastes away and dies.

The scirrhus tumours which occasionally appear on various parts are consequences of inflammation of some part of the absorbent apparatus; but the sheep is far less liable to them than the ox.

The vessels which contain the chyle all empty themselves into the thoracic duct, and so do the lymphatics which come from the hind extremities, the cavity of the abdomen and its viscera, the left side of the lungs, the heart, the diaphragm, the chest, and the left fore-extremity. The others pour their lesser streams into the subclavian and internal jugular veins, but which ultimately terminate also in the thoracic duct; and this mingled fluid, the crude chyle of the lacteals, and the more strangely compound mass conveyed by the lymphatics, and a portion of the blood from the subclavian and internal jugular veins, are here churned together, and then pass into the large veins, which open immediately into the heart.

Chapter XIII.

THE CIRCULATORY SYSTEM—THE HEART.

The centre, the grand moving power of the circulatory system, is the heart. It is enclosed in a membranous bag, and suspended in the middle of the chest by the attachments of its larger vessels to the roof of that cavity. It is of a conical shape, and its apex or point is loose in the lower part of the chest, inclined to the left side, and nearly touching the sternum. It has two sides, one devoted to the circulation of the blood through the lungs, and the other to its circulation over the frame generally. Each side is divided into two compartments, one above the other, termed the auricle and the ventricle. The chyle from the lacteals, and the lymph from the lymphatics, and the blood returned by the veins, collect in certain large vessels, and are poured into the upper compartment, or auricle, on the right side. The auricle is no sooner filled, than by an inherent power, to which more allusion will presently be made, it contracts forcibly on its contents. Part of the blood is thrown back into the vessels by which it was conveyed to the heart, and so there is a constant churning, and more perfect mixture of the different fluids of which it is composed; the other part is forced into the

ventricle below. That now contracts: the return of the blood into the auricle is prevented by a valvular apparatus; and it is forced through the pulmonary artery, a vessel which passes from the ventricle into the lungs.

Having undergone a most important change in its passage through the lungs, it is returned by other vessels to the left auricle; thence it is forced into the left ventricle, and, by the closure of that, into the aorta, or commencement of vessels by means of which it is conveyed to every part of the frame. The right ventricle is considerably larger than the left, and the walls of it are thinner than those of the left. It contains more blood, and there is less power to act upon it. The difference between these cavities is greater in the ox than in the horse, and in the sheep than in the ox. On account of this greater quantity of blood, and deficient power, the whole of that fluid is not forced from the ventricle by each contraction, but a portion remains, to undergo additional churning and admixture, in order better to prepare it for the nutrition of the animal. It may, however, so happen, in certain states of the constitution, that the blood may too much accumulate in this larger ventricle, and that the muscles of the walls of the heart may not have sufficient power to expel it, or to preserve the ventricle from being ruptured. In order to prevent this a strong muscular cord or column extends across the ventricle in the ox, to strengthen it, and to assist it in contracting. In the sheep this column is comparatively longer, and thicker. It takes a different direction, that it may act with greater power; it extends from the lower part of the outer wall of the ventricle to the upper part of the inner wall, or division between the two ventricles, and is inserted immediately beneath the valves; thus, by its contraction, supporting the ventricle where the wall is thinnest, and causing a greater and more powerful expulsion of the blood. The sheep has two duties to perform; namely, to supply us with food, and with raiment, and thus admirably does nature adapt the different structure of different animals to their own preservation and enjoyment, and the use of man.

There is a second tendinous band, lower down in the ventricle, with various roots or additions, and which still farther contributes to the strength of the part.

In the septum, or wall between the two ventricles, and at the base of the two large vessels which convey the blood on either side to the lungs, or to the general frame, is placed in the ox, and the sheep, and in most ruminants, a bone of an irregular triangular shape, in order to give strength and support to both of these vessels; for they are larger than in the horse, and in their usual action carry more blood for the important purpose of nutrition. This bone, the *os cordis*, is proportionally larger in the sheep than in the ox, because the double purpose which this animal has to perform requires a proportionately larger quantity of blood, and larger vessels to convey it, and therefore more support at their base. In order to show, that while this bone is useful to a certain degree as strengthening the base of the pulmonary artery, it was chiefly designed for the aorta—it forms a curve in the sheep, which adapts itself to the shape of the aorta. The bases of these arteries being thus supported, the septum or division between the ventricles remains firm, and each ventricle retains its proper form, and size, and capacity, whatever may be the disturbance on the other side.

The heart, being the fountain of life, acts in consequence of an independent power of its own. When its communication with the brain is cut off, it still beats on, although its action will have become somewhat irregular: when its communication with the organic system has ceased, its cavities continue to contract and to expand, and even when it is

removed from the body its pulsations will for awhile, and, in some cold-blooded animals for a long while, be observed. This independence of its action is a wise and kind provision of nature. It is connected, however, with the nervous system of the brain, and with those of organic life. Frighten the sheep, and see how quickly, and in what an agitated way, the heart beats! Take him at his ease, and with nothing to disturb him, and feel how quietly the current proceeds. It sympathises with, and tells of the healthy or diseased state of every organ, and of every part; and hence, the attention to the state and character of the circulation in examinations respecting health, and the nature and degree of disease.

So important an organ, while it sympathises with the diseases of every other, is liable to maladies peculiarly its own. The sheep, although not so greedy as the ox, yet occasionally swallows sharp and injurious substances. A needle found its way through the coats of the rumen, the diaphragm, and the pericardium, and produced an inflammation of the heart, which destroyed the animal*. Some of the varieties of the stipa, or feather-grass, have been supposed to be injurious to sheep. In Hungary, it is said to be occasionally fatal to whole flocks of them. Its sharp and barbed beards, not only irritate and inflame the rumen, but perforate it, and have worked their way to the heart and destroyed the animal†. There are very few cases of inflammation of the lungs, in which the disease does not extend to the pericardium; and there is no case of rot, in which the ventricles are not dilated, and the parietes of the heart softened. The symptoms, however, of these diseases are so obscure, that it would be superfluous to dwell longer on the subject.

The circulation of the blood through the lungs belongs to the respiratory system; the present inquiry will, therefore, be confined to the general circulation.

THE ARTERIES.

The sudden contraction, or percussive action of the ventricles, propels the blood forcibly into the arteries. These are a succession of tubes, proceeding from the vessel into which the blood is first poured; branching off in every direction, and, as they increase in number, diminishing in size. They are composed of three coats: the external one is formed of dense cellular tissue, capable of considerable extension, and a highly elastic power, by which, the cause of distension being removed, it suddenly recovers its former dimensions. It is this successive dilatation and contraction of the vessel which constitutes the pulse, and which is so anxiously examined by the practitioner in order to ascertain the rapidity or slowness, the force or weakness, of the heart's action. In the sheep the pulse is most easily detected at the left side; there the beating of the heart itself may be felt. Little more, however, can be gathered from this than the number of pulsations. In a state of health the pulsations are about 70 in a minute in the adult sheep‡. The person, however, who is accustomed to sheep will have little difficulty in discovering the pulse at the femoral artery, which runs obliquely across the inside of the thigh, and which will be best examined at about the middle of the thigh. The character of the pulse, as well as the number of beats, will there be discovered, and this will often be a valuable guide to the practitioner in the treatment of disease.

* Mem. de l'Acad. de Dijon, vol. i. p. 107.

† Annales des Sciences Naturelles, Sep. 1826.

‡ Hurtrel d'Arboval says 75; and Gasparin, 65. The author takes the intermediate number, as most coinciding with his own observation.

The middle arterial coat is muscular. It possesses little substance or strength in the neighbourhood of the heart, for the percussive contraction of that organ is fully equal to the propulsion of the blood; but the arteries pursue a devious course, and their calibre diminishes as they recede from the heart, and so by the friction of the blood against the sides of the vessels, the rapidity of the stream would be rapidly diminished, and at length arrested. To prevent this, and to aid the action of the heart, and that aid becoming more powerful as the action of the heart is less felt, the muscular coat increases in thickness and strength in proportion to the distance from the heart—and at length these muscles become the sole propelling power.

The same affections of the arteries which are observed in larger animals are occasionally found in sheep. After death—a morbid redness of their coats, proceeding either from inflammation, or from diseased condition of the blood—aneurism, or dilatation of a portion of the artery, producing often great disturbance in the circulation, as well as being an occasional cause of sudden death; and ossification of some portions of the artery, and most frequently in the neighbourhood of the heart, and being a cause of many complicated diseases, and of sudden death, are occasionally observed; but there are no symptoms that have been yet described by which their existence may be recognised during life.

THE CAPILLARIES.

The arteries continue to diminish as they recede from the heart, until they terminate in vessels as small as a hair, or scarcely the thousandth part of the bulk of a hair. Here the propulsive power of the heart has ceased, and the work has been taken up by the muscular coat under the influence of the organic nerves. These vessels open by a thousand minute orifices on every portion of the frame, and deposit the substance, or the secretion which is necessary for the supply and healthy action of this part—others run into minute glands, where various substances, altogether different in their composition, are eliminated, and others pursue their course to the exterior of the frame, and constitute the exhalent vessels, by means of which the superfluous aqueous portion of the blood is discharged, and also those injurious principles in the blood which have not been or could not be got rid of through the medium of the lungs.

This last office is imperfectly discharged by the skin of the sheep. There is a peculiar secretion from the pores of the skin, of which mention has been made in page 60—a soapy adhesive matter designed for the nourishment of the wool, and the protection of the animal from the deleterious influence of cold and wet. Not only in its healthy state is it impervious to water, but it would seem to be with difficulty penetrated, if penetrable at all, by the perspirable matter. Hence the difficult breathing which is excited in the sheep if he is in the slightest degree hurried. In the human being, and in most quadrupeds, when the arterial blood is hurried through the frame in order to afford a sufficient supply for the support of unusual muscular exertion, and is undergoing a rapid expenditure and change, a portion of the useless or excrementitious part of it is thrown off in the form of perspiration, and the lungs are to this extent relieved; but in the sheep double duty is in such a case required from these organs, and the animal is soon distressed.

It is probably on account of this want of action in the capillaries of the skin of the sheep, and this uniform defence which is assigned to it, that the sheep is evidently less liable than most other animals to rheumatism, to inflammation of the lungs, and to various other diseases consequent on

direct exposure to a changeable state of the atmosphere. On the other hand it is probably owing to the struggle between the closed and comparatively unused pores of the skin, and the various matters that are frequently determined to it and labouring to escape through it, that the skin of the sheep is so much more liable to disease than that of most other quadrupeds. The scab, when it gets into a flock, is a greater nuisance than any disease of the skin to which the horse or the ox is exposed. There are occasional aggravations of the scab among the British flocks, and on the continent there are cutaneous diseases which destroy hundreds of thousands of sheep every year.

INFLAMMATION AND FEVER.

The capillary vessels generally are the primary seat of inflammation. From some unknown cause the nervous fibrils which supply the capillaries of a greater or smaller portion of the frame act with morbid power on the muscular coat of the vessel, and it contracts itself more forcibly on its contents, and drives the blood forward with increased velocity. Other blood follows to supply the vacuum when the vessel again expands, and that, in its turn, is driven on, and thus an increased circulation of blood through the part or inflammation of the part—for they are synonymous terms—is established. It may continue local, or it may spread to neighbouring parts, and gradually over the frame, and constitute fever. It is an affection of the ganglial system, and governed by the action of the ganglial nerves.

Simple fever may be sometimes observed in the flock. When a sheep is careless about its food—when it seeks out some shaded or cold place to lie down upon while its companions are grazing—when it lags behind the rest of the flock, and heaves and pants if driven forward—when no local affection can be recognised, but there is beating of the heart, heat and dryness or clamminess of the mouth, and redness of the eye, the animal assuredly labours under fever. It is at first simple fever, and manageable. If a tolerable quantity of blood is abstracted, and a couple of ounces of Epsom salts administered, the evil may probably be nipped in the bud; whereas, if neglected, the sheep will probably be found seriously ill on the following day, and with some violent determination of inflammation to a particular organ or part.

Many lambs appear to be lost by simple fever. They are observed to be doubled up, shivering; and presently afterwards the muzzle and the feet becoming quite hot—the countenance is dull, or with an expression of distress—the appetite is gone—the eyes are weeping, and weakness is stealing fast on. There is in this case no particular organ or part to which to trace the disease. It is a general affection—it is fever. To-morrow it may be inflammation of the lungs, or inflammatory fever, or it may assume various characters. The loss of a little blood, and the administration of a dose of Epsom salts, will now restore the animal to his wonted health. To-morrow the case may be remediless. In these cases of simple fever, a mild treatment like this, with quietness and a removal to other pasture, if circumstances admit of it, will be all that will be required. No calomel should be given; and certainly nothing in the form of the farrier's comfortable—murderous drink.

Cases of *inflammatory fever* may sometimes occur. Febrile action may be set up, and speedily run its course. The hot and the cold fit may rapidly succeed to each other—attended by languor, dislike to food, stupidity, or perchance restlessness, or delirium. Where this is found it is attributable to bad management—too nutritive food—too great haste to

fatten—or the contest to induce unnatural and dangerous over-condition, and it must be treated in the most decided way by bleeding, purging, and starvation: but in the great majority of cases there is no inflammation at all—there is too great fulness of blood—determination of blood to the head—apoplexy, and death.

By a stroke of apoplexy a sheep is frequently destroyed in less than an hour—sometimes he falls and dies without warning. Inflammatory fever is sudden enough in its attack and its progress, but it takes more time to produce its fatal effect, and is not always preceded by that change of pasture, or change of food, which are fruitful causes of "blood or apoplexy." On good grass land, at any season of the year, and without any change of pasture, or previous appearance of disease, or violence of any kind, some sheep will lie down with the rest of the flock apparently well at night, and on the next morning be dead, and in as easy a posture as if they were asleep. Some meadows, and not always of the richest kind, are notorious for possessing this fatal quality, and to such a degree, that the sheep-master does not dare to turn his flock upon them. "Such sheep," says an anonymous writer, "are first discovered by not readily driving. If left, they will presently lie down, and appear dull and heavy. Shortly after, if a person goes to them, they get up unwillingly, and walk slowly away, straining often to stale, but without being able. In another short interval they must be forced or helped to rise, and then they will generally stale blood in small quantities, but quickly lie down again, and gather their feet under them. The stupor increases—they hang their ears, their eyes are shut, and the nose rests on the ground—and soon afterwards they die without a struggle. This generally occurs within the first four days or thereabouts. Upon the fourth morning, if the shepherd finds one dead, yet all the rest may appear lively and continue eating. If he immediately turns them into a grass field adjoining, they will spread themselves over the field and eat greedily; nevertheless in an hour there may be others visibly seized, and in the course of that day they will continue dropping at intervals, and during the next night and day some will continue to die *."

Mr. Price gives a dreadful account of this disease. "The number of animals that die of this disorder in Romney Marsh is truly astonishing: I should suppose nearly four in a hundred yearly in some soils and situations, and at peculiar seasons, although every precaution in stocking is taken to prevent it; which if the graziers did not, they would lose half their flock annually. My opinion is that the soil of Romney Marsh, being very rich, consequently the clover and grasses equally so, that sheep feeding on these rich pastures must be more subject to inflammation than those fed on poorer soils, particularly in the spring, when the young shoots of the grasses and natural clover are full of juices: besides, when in this state they are greedily eaten by the animals, which often proves fatal, particularly after a warm day or two.

"On opening them the contents of the abdomen are more or less inflamed, and some parts are very dark coloured, and emit a very offensive smell.

* There is a sykenes among shepe, called the blud. The shepe that hath it will dye sodainly, or he wyl stand styl and hange downe the head, and other whyl quake. If the shepherds can espy him, take hym and rub hym about the hede, and especially about his eares, and under his eyen, and with a knife cut of his eares in the mydst, and also let him blede in a vain under his eyen, and if it bleede well he is lyke to lyve, and if he bleede not, then kyll him, and save his flesh, for if he dye hymselfe the flesh is lost: and the skin wyl be far ruddier like blud more than another skin shal be, and it taketh most commonly of the fattest or best-lyking.—The Booke of Husbandrye. 1575.

Sometimes the heart or lungs appear to be primarily affected; and sometimes the liver, bowels, and stomach, which is very easily perceived by the dark and livid appearance of the part. It is said that bad-mouthed sheep never die of this disease, because they cannot feed on short nutritious grass, but on coarse long herbage which does not enrich the blood. I am of opinion that it is an inflammatory disease, and that the only remedy is large bleedings, so as rapidly to lower the system*."

A species of *malignant inflammatory fever* must not be passed over unnoticed, although fortunately it seldom appears among the British flocks, but is epidemic in some parts of France, and destroys thousands of sheep every year. It breaks out about the latter end of spring,—rages through the early part of the summer, and begins to disappear in August. Its early symptoms are:—suspension of rumination—loss of appetite—dulness—weeping from the eye—coldness of the ears—alternate shiverings and flushings of heat. Soon afterwards the mouth and the breath becomes hot—the eyes are red, the pulse is accelerated, and weak, and irregular, and there is a mucous discharge from the nostrils, to which succeeds bloody mucus, and then a mixture of purulent matter and blood. By degrees the urine becomes bloody, and the excrements are covered with grumous blood,—the head and the legs are swelled—the debility is extreme, and the animal dies in the course of eight or ten days.

The greater part of the animals attacked by this disease perish. The sheep in the finest condition die soonest, and with greatest certainty. Those that are out of condition, yet not unhealthy, struggle longest with the malady, and sometimes recover. If the weather is chilly the patients have less chance, but they begin immediately to renovate when the air becomes warm and seasonable. More lambs and shearlings perish than those of greater age. It is an epidemic, but not a contagious disease.

The appearances after death do not correspond with the apparently pestilential character of the disease during life. The mesenteric glands are generally enlarged—there is effusion, to no great extent, of bloody serosity in the thoracic and abdominal cavities—little affection of the small intestines, but the large ones exhibiting spots, or patches of inflammation and extravasation—the liver enlarged, and vesicular accumulations of a thick red fluid on its surface. The lining membrane of the air-passages is red—the passages themselves fill with a bloody spume, or with pure blood—the surface of the lungs covered with ecchymoses, and the right ventricle of the heart usually inflamed.

This disease is termed *La Maladie de Sologne*, from the name of the district in which it is most prevalent. La Sologne is a low marshy country. It produces few beside aquatic plants, and nowhere are small lakes of water more numerously scattered. When April is a rainy month, the disease is sure to follow speedily, and to be exceedingly destructive, and mostly so on the low grounds. The food of the sheep is very irregular; it is abundant in summer; it begins to get scarce in autumn, and is deficient during the other part of the year. In winter the sheep are half-starved: there is nothing in the fields, and nothing in the sheep-house but a little stubble and the leaves of trees. The spring grass in such a district is exceedingly succulent, and succeeding all at once to a state approaching to starvation, the occurrence and the devastations of this disease are no longer mysterious.

The manner of breeding and rearing the lambs is exceedingly faulty.

* Price on Sheep-grazing and Management, p. 392.

The ewes are poor and weak—they are ill-fed while with lamb—they have nothing but the worst fodder. The lambs, when dropped, are necessarily puny and weak. They can scarcely obtain sufficient milk to satisfy their hunger, and a portion of that milk is abstracted in order to manufacture a worthless kind of cheese. These lambs, debilitated and dying of hunger at other times of the year, gorge themselves in the spring on the watery produce of the district. There are sheep-houses, into which the young and the old are driven at night, but they are badly constructed—low, damp, and completely closed. The inhabitants of them have nothing to breathe but an impure and poisoned air. The treatment of the disease consists of dry food with salt, and the administration of camphorated drinks, with various vegetable tonics. During the earliest and febrile stage bleedings have been used, with good effect, but the time during which they are admissible soon passes away. M. Tessier, to whom the French agriculturalists are indebted for the most valuable observations on this malady, which not only is so destructive at La Sologne but in several other districts of France, has very little faith in any medical treatment, and has recommended the following rules for the prevention of the disease:—To keep the flock more in the sheep-house during the rainy season; to feed better the ewes that are pregnant, or that are giving suck; never to milk the ewes; not to turn the young lambs on those marshy situations on which the danger of being infected with the rot makes them afraid to place the mothers; to keep salt within the reach both of the lambs and the ewes; not to send the sheep to the field when the weather is cold, and to drive them back when storms threaten; not to shear the sheep so early as they are accustomed to perform that operation; and to endeavour by every possible means to drain the ponds and marshes with which that and so many other districts of France abound *.

Typhus fever is not so common among sheep as cattle, but it often destroys its thousands, and particularly when the sheep are exposed to cold and wet and deprivation of food. Many of the diseases which are recognised in Scotland, and in some parts of the north of England, under the name of "braxy," are of this description. It is most prevalent in Autumn, and sooner or later in proportion as vegetation ceases early or continues until a later period of the season. It is sometimes gradual in its attack, and slow in its progress; at other times the animal is destroyed in two or three days. Mr. Hogg thus, in substance, describes it:—The loss of cud is the first token of the presence of this, as well as most other serious diseases. The animal is evidently in a state of suffering, indicated by its manner of standing: the back is bowed, and the four feet are brought into the smallest possible compass; or the animal grinds his teeth, and expresses his uneasiness by lying down or getting up every two or three minutes. He creeps away from his companions, and lies in some retired place, bleating incessantly from extremity of pain. The eyes are heavy and dull, and the countenance is expressive of distress. The ears hang down; the mouth is dry, and the inside of it, or the lips, or both, covered with pustules or ulcers. The pulse is full and quick at first, but it soon assumes the character of debility, and there is great and general prostration of strength. The urine is high-coloured, the dung covered with fœtid mucus, and the breath most offensive. The appearances after death are various: but there is one general character of speedy decomposition. The heart is filled with black

* Tessier, Instruction sur les Bêtes à Laine, p. 281; and Dictionnaire Vét. par Hurtrel D'Arboval, iii, 81.

and congealed blood, or the lungs are gangrenous, or the liver enlarged and putrid. The lining membrane of the bowels is of a livid redness through its whole extent, and their contents are dreadfully offensive and putrid. The body emits a strong sulphureous smell, and the flesh has frequently engendered disease in the animals that ate of it. This dreadful malady is seldom seen in the south, and its ravages are very materially lessened in the north. It generally arises from feeding on watery or foul food, and is materially increased when the season is cold and wet. It often assumes an epidemic character.

If taken at the very commencement it may occasionally be subdued. The lancet and the Epsom salts are the best means of cure: but after apparent debility has commenced, few things will arrest the progress of the disease. Common salt, with gentian and ginger, are then indicated. In a few cases they effect a cure; but in the majority of instances the amendment is delusive, for the cold of the ensuing winter or spring too often destroys the patient *.

THE VEINS.

The arteries having ramified into myriads of capillaries, and thus effected the various secretions, and carried the elements of nutrition to every part of the frame, begin again to unite with each other, and to increase in size, and to convey the blood—now much altered in its character, and exhausted of its vital properties—back to the heart. They now assume the name of veins. The blood flows through them, not from any propulsive force behind, but by the influence of atmospheric pressure called into action by the temporary vacuum formed by the sudden expansion of the cavities of the heart. The stream thus set in motion is accelerated by the pressure of the muscles, while certain valvular duplicatures of the lining membrane of the veins permit the blood to flow in one direction only, namely—towards the heart.

The coats of the veins are weaker and more distensible than those of the arteries, and therefore they are subject to various enlargements, tem-

* For the sake of the veterinary student, the following account is given of the peculiar course of the arteries in the head of the sheep:—

"The arteries of the head of the sheep are very remarkable in their distribution. The common carotid gives off collateral branches, before it divides into two principal trunks, from which all the other branches are given off. The branches which pass off before the principal bifurcation, are the superior thyroideal, the ascending pharyngeal, the occipital, the lingual, the posterior auricular, and a parotidean. The external maxillary artery is wanting, and its branches are furnished by other vessels. The common carotid bifurcates into the facial and internal maxillary: the facial furnishes the anterior auricular and the temporal; it is continued under the name of transversalis faciei, which gives off the coronary artery of the upper lip. The inferior coronary is furnished by the mental, which is itself a branch of the internal maxillary. The latter is a very important artery in the sheep; for it not only furnishes branches to the face, but also all those which in man come from the internal carotid. It gives off on each side three branches, which penetrate separately into the cranium, where they ramify in the rete mirabile, from which they pass to form the simple trunk of the cerebral arteries, which communicates with the basilar, and is distributed to the brain. As there exists no internal carotid, the carotid canal is wanting; the sulcus which is observed on the sides of the sella turcica, and which resembles the carotid sulcus in man, contains only the inferior cerebral vein which passes from the cranium by the spheno-petrosal fissure.

"With respect to the branches that pass off from the common carotid, it is necessary to be observed that the ascending pharyngeal, and the occipital, arise from that artery before the lingual; and with respect to the superior maxillary, the first cerebral branch arises between the inferior maxillary and superior alveolar; the other cerebral arteries, and the ophthalmic, are situated between the superior alveolar and infra orbitar."—Nova Acta Acad. Natur. Curios., tom. xiii. pars 1.

porary and permanent. These are frequent in the horse—they are occasionally seen in the ox—they doubtless, under certain circumstances, exist in the sheep, but they have not been noticed in that animal.

BLEEDING.

The only thing with regard to the veins that comes within the scope of this work is the opening of them for the purpose of the abstraction of blood. In every case of febrile action, the diminution of the vital current by means of venesection is one of the most important means of relief and cure that the surgeon has at his disposal.

The artery is not usually selected for this purpose, because there are few of the arteries that are superficial; because they are smaller than the veins, and not so easy to open; and also because it is often very difficult to arrest the flow of blood from a wounded artery. The veins are more superficial—they are larger—their coats are more easily penetrated, and the bleeding is more easily stopped. The shepherd is generally accustomed to bleed from the angular or cheek vein. He needs no assistance in order to accomplish this. He opens his lancet, and holds it between his lips—he then seizes the sheep, and presses him firmly between his knees, so that he shall neither be able to get away nor to struggle much. After this, moving his left knee a little in advance of the right, and passing his left hand under the head of the animal, he presses with his fingers beneath, and within the right jaw, near to the posterior angle of it, in order to compress the angular vein which passes at that place, and to make it swell. With the other hand he touches the right cheek, at about an equal distance between the eye and the mouth. He there finds a long tubercle, and beneath it he will feel the swelling of the angular vein. He then takes the lancet which he held in his mouth, and opens the vein in a direction from below upwards, and half a finger's breadth below the middle of the tubercle. Having abstracted as much blood as he deems the case to require, he ceases to press upon the vessel, and the bleeding will generally stop; but in order perfectly to secure this, it will be prudent to close the orifice with a pin. If the vein does not readily rise, a ligature passed round the neck will render it much larger and more tangible.

In cases of rheumatism, or garget, or local inflammation referrible to the hind-quarters, it may sometimes be advisable to bleed from the saphena, or thigh vein. The assistance of another person is required here. The sheep must be laid on his side, on a table, or on some straw, the thigh from which it is intended to abstract the blood being undermost. The other three legs must then be tied together, and the assistant must draw out and firmly hold the fourth, while the operator cuts away the hair from that portion of the thigh at which he intends to operate. A person acquainted with the anatomy of the part will at once put his finger on the course of the vein on the upper part of the thigh, and compress it, and thus cause it to become larger below the pressure; but he who is not so much used to the operation will do right to pass a ligature (a piece of coarse tape will constitute the best) round the higher part of the thigh, which will render the vein sufficiently evident. It must be opened, and afterwards secured in the same manner as the cheek vein.

It, however, occasionally happens, that the blood will not flow rapidly from either of these veins, or the stream will stop before the desired quantity is obtained; it will, therefore, be better practice to bleed at once from the jugular vein, as in the horse and in cattle. An assistant is here also requisite, who is to hold the sheep by the ears or by the horns, keeping the

head somewhat elevated, and the animal closely pressed and confined between his knees. A little of the wool is next to be cut away with a pair of scissors, in the direction of the jugular, and about the middle of the neck, and a ligature tied round the neck below the part thus marked. The vein is then to be opened in the manner already described, and, after a sufficient quantity of blood has been taken, the vein must be secured by means of pins and a few fibres of wool.

The quantity of blood to be abstracted at once will depend on the state of the sheep and the character of the disease. In case of fever, or of any serious disease that requires bloodletting, the stream should continue to flow until the character of the pulse is in some degree altered, or it begins to falter or intermit: the flow of blood should then be immediately stopped, and there should be considerable hesitation before a second bleeding is attempted. The sheep contains but a small quantity of blood, in proportion to his size, compared with other animals. A lean man, in good health, contains about one-fifth part of his weight in blood—but in proportion as his weight accumulates from idleness or tendency to fatness, the blood bears a less proportion, and may be averaged at one-tenth of his weight. The blood of the horse is about one-eighteenth part of his whole weight—that of the ox in good condition somewhat more than a twentieth part; a sheep in fair marketable condition has but one twenty-second part of his weight in blood, and on an average of all the fatted sheep, exhibited at the Christmas Show for many years past, and slaughtered in the metropolis, so far as the quantity could be ascertained, and the author was at no little pains to obtain a fair average, the blood constituted rather more than one twenty-eighth part of the weight of the animal. This is a wise provision of nature, as rendering inflammation somewhat difficult to be excited in those who, from their gross fatness, and want of exercise, and redundancy of food, would seem so likely to be the subjects of it; and it is a lesson to the practitioner and the farmer, in their treatment of this animal when diseased, not to reduce the vital powers too rapidly and too far.

Chapter XIV.

THE RESPIRATORY SYSTEM.

The blood that is returned by the veins, and the chyle that is brought by means of the absorbents, must undergo a certain process of purification before it is rendered capable of supporting life: it must get rid of a portion of the superabundant carbon, and it must attract and absorb a quantity of oxygen. This is accomplished by means of the lungs. The auricle on the right side of the heart receives this returned blood and chyle, and transmits it to the ventricle, whence it is propelled through the medium of the pulmonary artery into the lungs. The lungs are composed of innumerable minute cells, the terminations of the air passages, when the bronchial tubes have attained their utmost degree of minuteness. These cells do not communicate with each other, but are composed of, or separated by membranes infinitely finer than the gossamer's web. On this web-like membrane the vessels carrying the impure venous blood ramify. At each act of inspiration these cells are filled with atmospheric air, and through these delicate walls certain of the principles of the air pass—the carbon of the blood is given to the air, and imparts to it a poisonous quality, and a

portion of the oxygen of the air is given to the blood, and communicates to that fluid a vital power. As the air becomes loaded with carbon, and exhausted of oxygen, it is expelled by the act of expiration; and by an act of inspiration, or inflation of the lungs, they become again distended with fresh air. By means of the percussive action of the heart the blood pursues its course over these gossamer membranes; and, as fast as it is purified, is returned to the left side of the heart, to be thence propelled through the general circulation.

THE RESPIRATORY PASSAGES.

The respiratory passages in the sheep must now be described as rapidly as the subject will permit. They commence with the nostrils, which are far from being so expanded as in the horse, but which are peculiarly adapted for the purpose of quiet and undisturbed breathing, and can be contracted still closer, in order to ward off an attack of that pest of the sheep in the summer months—the fly. It is therefore somewhat difficult to obtain intelligence of the general state of the circulation, and particularly in the respiratory organs, by inspecting the colour of the membrane of the nose, as in the horse and ox. If, however, the aperture of the nostril is small, it is in a very striking degree more circular than in the horse or ox, in order that it may be sufficiently open for the ordinary purposes of breathing.

If the nasal cavity itself is now examined it will be found completely filled by the thin, and cellated, and complicated bones which are placed there in order to render the sense of smell more acute, by increasing the surface on which the olfactory nerves may ramify. The great development of the æthmoid and turbinated bones are well shown in the cut of the section of the head, p. 384, figs. 12, 13, and 14. The lower one fills up as it were the whole of the cavity, accounting for the readiness with which the respiration of the sheep becomes distressingly laborious when he is a little hurried.

NASAL DISCHARGE.

The sheep suffers like other domestic animals when the sensitive membrane of the nose becomes inflamed by exposure to cold in the winter or at other times. The consequence of that inflammation is tumefaction of the membrane, and obstruction in the nasal passages, and some degree of difficulty in breathing. Matter will be seen running from the nostrils of three-fourths of the sheep of some flocks in the winter; and it will annoyingly plug up the narrow aperture of the nasal cavity, already filled by this singular development of the æthmoid and turbinated bones. The animal will stop for a moment at every second or third bite at the herbage, and will snort violently, or stand with his head protruded, labouring for breath. Some persons have imagined that this gleet is contagious, but there is no proof of its being so: it rather spreads through the flock, on account of all the sheep having been exposed to the same exciting cause.

This will sometimes continue during the whole of the winter months, the health of the sheep being little or not at all affected. It is a mere local affair, and there is not even enlargement of the submaxillary glands. Then, as in a similar disease in oxen, as soon as the warm breezes of spring are felt, the discharge rapidly diminishes; and, whether it is to be attributed to the genial change of the season, or to the medicinal power of the first flush of grass, in the course of a week not a vestige of it remains in nine-tenths of the flock. But the tenth part?—why that which renovates the

others produces in them a faint struggle against the malady; they soon become weaker and weaker—the inflammation spreads and affects other passages—ulcers are in the nose—every sinus is full of pus—the larynx, the windpipe, and the air passages of the lungs, are lined by a kind of false membrane composed of mingled mucus and pus, and underneath that is a flush of inflammation of the intensest kind, with deep and spreading ulceration. The animal continues to get weaker, and more and more emaciated, until pulmonary consumption is confirmed, and death closes the scene.

In some cases the "fever powder" (see list of medicines) may be given with advantage, in doses of from ten grains to a scruple. In bad winters, and when the disease is more prevalent and virulent than usual, it may be given to the whole flock; there will be fewer of the fated lot remaining, and some of them will be redeemed from the destruction that seems to await them.

If much, however, cannot be done in the medicinal treatment of this disease, a great deal may be effected in the way of prevention. If the return of spring cannot be hastened, the shiverers can be removed to a drier and warmer situation: especially, some shelter can be afforded for the ewe that has just yeaned, and for the newly-dropped lamb.

This disease has been called the *glanders* of sheep, but it has no affinity to that malady of the horse. The result of several experiments on this important subject is, that the sheep is not susceptible of glanders. There is no instance of the disease being communicated by a glandered horse feeding in the same pasture with sheep. The matter of glanders has been thrust up the nostrils of the sheep without bad effect; and the horse has been inoculated with matter from the nose of the sheep labouring under this disease, without any evil consequence.

This disease must not be confounded with another discharge, small and limpid, but accompanied by seemingly insupportable annoyance to the animal, who is snorting and throwing himself about, and galloping in every direction. This, as has been already described, attacks only a few of the flock, and is occasioned by the larvæ of the *æstrus ovis* crawling up the nostril, in order to reach their destined residence during their larval or caterpillar state.

STRANGLES.

Occasionally, but very rarely, a disease is recognised in sheep—usually hoggets—resembling strangles in the horse, and strangullion in cattle. A swelling appears under and between the jaws, at first hard, but gradually, as it enlarges, softening, and evidently containing matter. It is hot and tender, and the sheep loses his appetite, and coughs, and becomes evidently and rapidly weak. As soon as the tumour *points* at any particular part of it—yields to the pressure of the finger, and shows that there is fluid beneath—it should be lanced, otherwise deep and troublesome ulcers will probably be formed about the throat. The wound, if offensive, should be washed with a solution of chloride of lime, and healed as quickly as may be, by the application of the tincture of aloes. A dose of Epsom salts should be given with a little ginger, and there the matter will usually end. In case of continued weakness, small doses of ginger and gentian will be useful. The maturity of the tumour, if slow, may be hastened by the application of a blister. It is the regular and indispensable progress of this disease, that matter should form in the tumour and be discharged. It will hence appear, that physic is not indicated before the suppuration of the tumour, and that bleeding would be detrimental unless there is a considerable degree of fever.

When the upper part of the nostril of the sheep is examined, it will be perceived that the cartilaginous division between the nostrils is not perfect, as in the horse. It extends sufficiently far, and hangs sufficiently low, to impede the spread of inflammation in common cases; and the sheep not being susceptible of glanders, nothing more is required. For the same reason also, the velum palati, or curtain at the back of the mouth, does not reach the tongue as in the horse, but leaves room for breathing through the mouth, and also for the regurgitation of food in the same way.

The *Os Hyoides* of the sheep is very similar in construction to that of the ox, described in Cattle, page 325. There is no spur penetrating into the root of the tongue, and confining it there in order to give a firmer cushion for the bit, but there is the same additional joint in the cornua or wings of the bone, giving still more extensive action to this organ, and there is also that curiously-formed socket in the temporal bone, in which the os hyoides can play so loosely and yet be attached so securely. For the convenience of man the freedom of the tongue of the horse is restrained; and from the double set of incisors which he possesses, and the food by which he is usually supported, he suffers little or no inconvenience on this account: but the sheep, as well as the ox, requires the most extensive action in this organ, in order to assist in gathering the food, and freeing the lips and the muzzle from many a nuisance by which the animal would be otherwise annoyed. This subject, however, has been already adverted to.

There is nothing peculiar to detain the reader in the structure of the LARYNX in sheep. It is comparatively shorter and wider in this animal than in the ox; the opening into the windpipe is smaller, and, consequently, the epiglottis or covering of this fissure is also smaller; the thyroid cartilage is still weaker than in the ox, and there are no lateral ventricles. The natural voice of the sheep does not require even the degree of complication which is found in the ox, for the sheep is comparatively a silent animal. Its voice is seldom heard except when the mother is calling her lamb, or the lamb is bleating for the mother; or, in their travels to and from the fold, or from one pasture to another, they are challenging the companions from whom they are for awhile separated. During the period of œstrum the voice of the ram is but a kind of low indistinct grunt, and the ewe utters only the same unvarying sounds when she is caressing her lamb. There is, however, sufficient difference in the voice to enable the mother to recognise her own lamb in an instant, in the midst of a flock of many hundreds.

The thyroid glands are two small oval glandular bodies, placed on either side and in front of the windpipe immediately below the larynx. Their use is not known, but they doubtless effect some important purpose, for they are plentifully supplied with nerves and blood-vessels. They are frequently diseased in the sheep. In young lambs, early dropped, and half starved, they will uniformly be found enlarged; and in every case in which the farmer traces the progress of the rot, he will find the same kind of enlargement, contemporary with, and marking the precise period when the stage of debility and emaciation commences.

The *windpipe* differs principally from that of the ox, in being proportionally smaller and weaker. The cartilaginous rings have less firmness, and the interposed ligamentous substance has not the same power; but they are closer together, for the head of the sheep has not to be depressed so much in the search of food as that of the ox. There is a still weaker connexion between the rings at the posterior part of the windpipe; there is the same absence of the transverse muscle, and the lining membrane of this tube is thinner and weaker.

It is comparatively seldom that there will be occasion to open the windpipe of the sheep, in order to prevent suffocation from obstruction in the larynx above, and to enable the animal to breathe. In two cases, one of inflammation of the larynx, and the other of obstruction in the pharynx, the author had recourse to it, and with complete success. The operation is described in page 162 of "The Horse," and 374 of "Cattle." It may be performed quite as easily and safely on the sheep.

At the base of the windpipe commence the bronchial tubes, or that continuation and subdivision of the windpipe by which the air is conveyed to and from the terminating cells. There is the same contrivance of cartilaginous rings, in order that these passages may always be pervious; and there is the same ligamentous or muscular apparatus by which the action of these cartilages is regulated. The diseases of these important organs may now be considered.

CATARRH.

The affection of the nasal passages which has been described in page 485, frequently extends to other portions of the respiratory canal. It involves the pharynx and the throat, and the membrane of the larynx; and then the discharge from the nose, and the redness of the eye, and the defluxion from the eye, and the loss of appetite increase, but without any great degree of fever or laboured breathing. The farmer will here distinguish the frequent sneezing that accompanies nasal discharge, from the cough more or less frequent and painful, which proves the extension of the disease at least as far as the larynx. If the cough is observed more than a few days, and especially if it is accompanied by the above-mentioned symptoms, he will be wrong if he does not have that sheep caught, and bleed him, and administer first a purging drink, and, that having begun to operate, the fever medicine: if the weather is cold the animal should be removed to the straw-yard, or to some dry and sheltered situation. It will be seen by and by that this cough creeps on most insidiously and dangerously, and lays the foundation for, and degenerates into that fatal affection of the lungs—phthisis, by which hundreds of thousands of sheep are destroyed every year.

LARYNGITIS.

Inflammation sometimes attacks, or exerts its greatest virulence on, particular portions of the respiratory passages. It oftenest does so when any epidemic or atmospheric influence mingles with the origin or progress of the disease. Sheep, and particularly in the changeable weather of the spring or autumn, are suddenly affected with cough, which by its urgency and sharpness of sound, is especially referrible to the larynx. It is not merely the snorting that accompanies and characterizes nasal catarrh, although there is a frequent effort to get rid of the matter which runs, and sometimes in great quantities, from the nose, but is now of a thinner and less adhesive nature, but there is a painful and ringing cough. The sheep is often observed to stretch out his head, as if to breathe more freely. There is evidently a dread of suffocation, yet not referrible to obstruction in the nose: the open mouth and stretched out neck plainly refer to the upper part of the throat, and, occasionally, some have perished from general thickening of the larynx and the closure of the entrance into the windpipe. Bleeding in urgent cases, purging, and, above all, removal to a more sheltered pasture or to the straw-yard or sheep-house, will afford the best chance of cure.

It may be difficult to describe the symptoms which characterize inflammation of the windpipe, although examination of many sheep after death has shown that this was the portion of the respiratory passages principally affected. It is, however, most usually complicated, either with inflammation of the larynx, or of the bronchial passages within the lungs.

BRONCHITIS.

Lambs, and particularly when too early, and too much exposed, are subject to inflammation of the bronchial passages, indicated by loss of appetite, tenderness when the throat, or the belly is pressed upon, and particularly by a *wheezing* cough, which the careful observer will at once distinguish from the ringing one of laryngitis. The Epsom salts, with, in the treatment of the diseases of these youngsters, the addition of more than the usual proportion of ginger, will generally give relief, especially if the comfort of the animal is somewhat attended to.

Bronchitis in young cattle is often accompanied or caused by the presence of worms in the air passages, which are a source of great irritation, and frequently of death. Sheep are far less troubled with these parasites: but several cases have come under the cognisance of the author, in which the air-tubes were filled with them, and the animal destroyed by the inflammation which they set up. This will be suspected when the cough is unusually distressing, and almost continual. Like the same disease in cattle, it is confined almost entirely to low marshy, woody pastures—and to young lambs and hoggets; and is oftener seen in those that have been neglected and are weakly, than in the well-fed and healthy stock. Occasionally, however, it prevails in dry summers, and on good pastures, when the ponds are nearly dried, and full of animalculæ.

The first, and the most important curative measure consists in removing the sheep from the pasture, of whatever character it may be, on which they become diseased. The medical treatment lies in a small compass; it is the administration of common salt, in doses of 1½ or 2 oz., daily, with 6 or 8 oz. of lime-water, given in some other part of the day. The author is indebted to his friend Mr. Mayer, of Newcastle-under-Line, for the knowledge of this most successful method of treating bronchitis in young cattle, and he has found it quite as successful in sheep *.

ACUTE INFLAMMATION OF THE LUNGS.

This is by no means an unfrequent disease among sheep. It is caused by cold and wet pasture—chills after hard driving—washing prior to shearing—shearing during inclement weather, and other circumstances of a similar description. Its first indication is that of fever—hard and quick pulse—disinclination for food—cessation of rumination—unwillingness to move—slight heaving of the flanks, and a frequent and painful cough. To this succeeds a more frequent and distressing cough—a greater disturbance of respiration—a total disgust of food—an oppressed and perhaps intermittent pulse—a discharge of fœtid matter from the nose—a grinding of the teeth—an insatiable thirst and an eager darting at the food offered, but which is afterwards retained in the mouth unmasticated, as if the animal were unconscious of its presence. A short time only passes ere other symptoms follow. The pulse becomes almost imperceptible, the cough is weaker and yet more painful—the flanks convulsively agitated—a crepitus, or pressure on the loins—a nauseous discharge from the nostrils—a stag-

* See Veterinarian, vol. viii. p. 399.

gering walk—a clouded eye—a countenance expressive of suffering and despair. The cough now ceases—the pulse dies away—the animal becomes half unconscious—perhaps delirium succeeds, shortly after which death closes the scene. Examination after death exhibits the lungs, almost always, gorged with blood, black, decomposed, and lacerated by the slightest touch, and one, or sometimes every lobe strangely increased in bulk, and not subsiding in the slightest degree when the atmospheric air presses upon it. These are the characteristic lesions, but in addition to them are inflammation of almost all the viscera—fullness of the maniplus, distension of the abomasum, and enlargement and softening of the liver.

It is difficult to account for the fact, that inflammation of the lungs in sheep generally takes on this gangrenous character. Is it because the animal seems to be destined to the quiet and undisturbed accumulation of fat and growth of wool, and that no provision is made for those disturbances of the respiratory apparatus, and therefore the structure of the lungs is soon disorganized?

If such is the rapid and fatal progress of this disease in sheep, characteristically called by the shepherds, the "rot of the lights," the course of treatment is sufficiently plain. In the early stage bleeding and purging must be carried to their full extent: for by such means alone can a disease like this be subdued. On the other hand, however, the actual state of the patient must be carefully ascertained. Depletion may be of inestimable value during the continuance, the short continuance, of the febrile state; but excitation like this will soon be followed by corresponding exhaustion, and then the bleeding and the purging would be murderous expedients, and gentian, ginger, and the spirit of nitrous ether, will afford the only hope of cure.

CONSUMPTION.

There is another, and still more frequent, and equally fatal disease of the lungs, but it assumes an insidious character, and is not recognised until irreparable mischief is effected, viz., sub-acute, or chronic inflammation of the lungs, and leading on to disorganization of a peculiar character—tubercles in the lungs, and terminating in phthisis. The sheep is observed to cough—he feeds well, and he is in tolerable condition—if he does not improve quite so fast as his companions, still he is not losing ground, and the farmer takes little or no notice of his ailment. Perhaps it can hardly be expected that he should, for although it might be difficult, or perhaps impossible to prepare this cougher for the Christmas show at Smithfield, there is no difficulty in getting him into fair marketable condition.

He is driven to the market, and he is slaughtered, and the meat looks and sells well; but in what state are the lungs? Let him who is in the habit of observing the plucks of the sheep, as they hang by the butcher's door, answer the question. He sees plenty of sound lungs from oxen—he sees the lungs of the calf in a beautifully healthy state; but he does not see one lung in three belonging to the sheep that is unscathed by disease—whose mottled surface does not betray inflammation of the investing membrane, and in the substance of which there are not numerous minute concretions—tubercles.

Perhaps these lesions quickly follow sub-acute inflammation of the lungs, but they do not rapidly increase afterwards. Their existence produces a slight cough, which scarcely interferes with health—nay, it is a matter of question whether the degree of irritation which they produce does not for awhile stimulate the lung to an increased discharge of duty, and whether

there is not more blood arterialised, and more flesh and fat produced; and therefore, in the modern system of grazing, when the sheep is sent to the market, sometimes at eighteen months old, and seldom later than thirty months, this disease, which at a more mature age would destroy the animal, is disarmed of most of its terrors.

This constitutes a material distinction between consumption in the cow and the sheep. In the first animal there is for a time, and often a long time, appetite and condition, and a plentiful secretion of milk; but, for the purpose of breeding and milking, the cow is kept year after year, until the disease is fully established and runs its fatal course: in the other animal the disease is not allowed time to develope itself. But what is the case, and that not unfrequently, with the ram and the ewe when they get three or four years old? The cough continues—it increases—a palidness of the lips, or of the conjunctiva, is observed—a gradual loss of flesh—an occasional or constant diarrhœa, which yields for awhile to proper medicine, but returns again and again until it wears the animal away. How many, in a breeding stock of sheep, perish in this way? Of how many diseases is this cough and gradual wasting the termination? It is the frequent winding up of turnsick; it is the companion and the child of rot.

This disease is especially prevalent in low and moist pastures, and it is of most frequent occurrence in spring and in autumn, and when the weather at those seasons is unusually cold and changeable. It is almost useless to enter into the consideration of treatment. It would consist in a change to dry and wholesome, and somewhat abundant pasture—the placing of salt within the reach of the animal, and, if he was valued, the administration of the hydriodate of potash, in doses of three grains, morning and night, and gradually increasing the dose to twelve grains. With regard, however, to the common run of sheep—when wasting has commenced, and is accompanied by cough or dysentery, the most honest and profitable advice which the surgeon could give to the farmer would be, to send the animal to the butcher while the carcase will readily sell.

EPIDEMIC DISEASE.

In a great measure the sheep is exempt from those epidemic diseases by which so many horses and cattle are frequently destroyed. The cause of this immunity it is perhaps difficult to explain. The sheep do not lead so artificial a life as some of the other domesticated animals, and they have a disease peculiar to themselves, sufficiently destructive, without sharing in the epidemic maladies by which the others are swept away. The earliest record in British history of any prevalent fatal disease among sheep, is dated 1041, when it is said that the greater part, both of cattle and sheep, were destroyed. Another still more destructive epidemic occurred in 1125. In 1315 an epidemic prevailed that was equally destructive to the human being and to every other domesticated animal; and another of a similar character followed in 1665. In general, however, the sheep were exempt, or suffered slightly*.

* In the gardens of the Zoological Society of London, there are generally several foreign sheep—some from the interior of Asia—others from the north, and others still from the southern extremity of Africa. They arrive in the gardens, usually in fair, but never in good condition; but we cannot keep them. Few or none die of the rot, but they are phthisical—and they waste and waste away, to a degree that would scarcely be thought possible. They stalk about actual living skeletons; dysentery in the latter stages contributes to hasten the catastrophe. Some from Wallachia or from Hungary continue with us year after year, but not one of those from a torrid climate lasts out the second year, and when they die the lungs are tuberculated or full of vomicæ.

In the years 1834 and 1835 an epidemic prevailed among the sheep in the colony of New South Wales. Some of the settlers lost more than half their stock, and the mortality was fearful through a considerable portion of the colony. In conformity with the order of the Governor, Mr. Bennet, the surgeon to the colony, assisted by two other gentlemen, inquired into the nature and cause of the malady. The following is an abstract of their report, which will give the reader some idea of these occasional epidemics in modern times:—

The character of the runs on which the sheep fed was that of lofty ranges abounding in excellent pasture and good water. They had been placed in this locality five or six years, and had remained perfectly healthy. The winter months had been dry with severe frosts, but the rain setting in during the latter part of the spring, the epidemic began to appear.

The animal separates from his companions, and appears depressed and listless; the eyes are watery, the membrane of the nose red, and the sheep sneezes frequently. A watery discharge, but soon becoming glairy and clammy, is observed from one nostril, and there is a collection of adhesive mucus encrusting the eye-lids—the animal ceases to ruminate, and droops his head, but is evidently uneasy and continually shifting his posture or his place. This first stage lasts from four to twelve hours. The eyes and nose become redder; the discharge increases; it is thicker and of a yellowish hue, and it hardens about the orifices of the nose, and obstructs respiration. The orifice of the nostrils is swelled, the breathing is evidently hurried, and the animal is in great pain; the head is heavy and is rested on the hurdles of the fold, and a cough, troublesome and painful, is observed.

The third and last stage now advances. The membrane of the nose assumes a leaden or dark purple hue; the discharge is lessened, but it is very thick and streaked with blood; the breathing is more laborious, and the cough more painful. The lips and particularly the upper lip, the nostrils, and sometimes the whole face and head, are swollen; and, presently, a general trembling comes over the animal; he appears stupid; he runs against everything in his way; he kneels down, or falls down, becomes comatose, and, after a few struggles, expires.

In some of the sheep death occurred in six hours after the first attack—oftener twelve hours elapsed, and sometimes the animal lingered on to the third day. If he lived beyond that time he usually recovered. In those that did recover, general debility remained for a long while, and in almost all of them the wool fell off, leaving the poor animals perfectly naked.

The surface of the body, after death, appeared to be of a dark purple, or livid hue, and the carcase very speedily became putrid. Post mortem examination presented, in most cases, inflammation of all the sinuses of the skull, a strong infection of the membranes of the brain, but not the slightest disease of the substance of the brain. The membrane of the nose was highly inflamed and thickened, and a tough viscid matter was effused over it, which could be scraped away with a knife. In many cases the disease was confined to these membranes, except that the heart was gorged with black blood. In other animals the disease was confined to the pulmonary organs, the inflammation extended down the larynx, the trachea, and all the bronchial passages; the membrane was thickened, and the air-tubes obstructed with viscid mucus. The stomachs were usually healthy, and filled with food in a healthy state: the whole of the intestinal canal was perfectly sound, except that the fæces had accumulated in hard lumps, and produced some abrasion of the mucous membrane. The liver was usually free from disease, as were also the kidneys and the bladder.

The treatment was simple but decisive. The animal was bled almost to fainting, and an ounce of Epsom salts administered with a drachm of nitre in warm gruel. The infected sheep were separated from the sound ones, without, however, fatiguing or distressing the animals by long or harassing journeys or otherwise. If the patient was not relieved in four or six hours, the bleeding was repeated, and the quantity regulated by the effect which it produced on the pulse. The administration of the salts was also persevered in until the bowels were well opened. The chance of success was greater in proportion as these remedial means were early applied. Even in the second stage of the disease, they occasionally had good effect, but in the third stage they were of no avail. Relapses or change of weather were frequent: the convalescents being for a long period extremely weak. There did not seem to be any preventive; and those who bled all their sheep, on the appearance of the disease in a few, had reason to repent of it, on account of the greater number that were eventually attacked, and the increased proportion of deaths. It was difficult to ascertain the number of sheep that were affected and died or recovered, because this epidemic, like almost every other, was very capricious as to the farms that it attacked, and the proportion of its victims. The greater part of the flocks escaped altogether. Where a flock of sheep consisting of about 300 was attacked, the average number of patients would be 100, of which about 55 would recover and 45 be lost. The whole number of deaths was more than 7000. It was plainly an infectious disease, but only communicable when the animals were brought into actual contact.

Chapter XV.

BREEDING—THE GENERATIVE AND URINARY SYSTEMS.

The object of the sheep-master is to raise and to retain that animal which will pay best for the consumption of its food. With the breeder of cattle this is a very simple affair—he selects and cultivates that animal which will attain the greatest maturity and weight in the shortest time, and on the least quantity of food. The dairy-man wishes to add another quality to the aptitude to fatten, namely, the yielding, and for a considerable time, a large quantity of milk. The sheep-breeder also derives his profit from two sources, the early maturity of the carcase, and the quantity and useful properties of the wool. Both will occupy his attention: the first, in every case, and as his grand object; the second as valuable, but regarded more as a subsidiary.

How shall he attain these objects? He looks carefully over his flock, and he observes that some of his sheep—the food and the general management being the same—fatten more quickly than others. There is the same attention paid to all, but the profit is abundantly more from some than from the majority of their companions. He is anxious to account for this. He compares these sheep with some of their fellows, and he observes that there is an evident difference of conformation, a fineness of bone, a roundness and compactness of form, a condensation of substance, and a beautiful proportion of every part. He studies this, and he finds that there is more or less of this conformation in every sheep that materially outstrips his fel-

lows. He inquires farther, and if he has employed different rams, the one that possesses most perfectly this peculiarity of form, and its accompanying aptitude to fatten, was the parent of these promising sheep, or their dam had these points in considerable perfection. He now begins to form some notion of the kind of animal that the profitable sheep should be; and he has living proof that these valuable properties may and will descend to the offspring.

His pride and his interest are involved, and he examines these flowers of his flock with still closer attention. He finds that, in the handling, they present as great a difference to the feeling as they do to the eye. There is a softness, a springy elastic softness, in distinction from the hard, harsh, unyielding nature of the skin and the texture immediately beneath it in others, which once impressed on the mind, can never be forgotten; and he associates this with the certainty of early maturity.

Having satisfied himself with regard to these things, he dismisses the ram that does not exhibit these qualities, or that fails in getting lambs possessing them; and the ewes that do not approach to the beau-ideal which he has formed in his own mind, or whose lambs are inferior in appearance or in thriftiness. He fattens these and sends them to the butcher. He collects together the lambs as soon as their form and qualities begin to develop themselves—a little experience will enable him to judge accurately of this at a very early age—and without hesitation he discards those that are not up to the mark, whether ram or ewe-lambs. He puts by a few of the very best of the males for a second examination at no very distant time, and every faulty one is selected from the ewe-lambs, and prepared for the butcher as quickly as may be. In this way the flock is systematically and rapidly improved, and the breeder is well repaid for the diligent attention which he has given to this important object. *If his flock is large he will find in this principle of selection every thing that he can want.*

There is one point more, the importance of which he cannot overrate—*he should never preserve a lamb that has an evident and glaring defect.* In proportion as his flock improves he should regard this as a rule that admits of no exception; for the principle that "like produces like" extends as powerfully to the defects as to the excellencies of the animal. The progeny infallibly inherits the defects as well as the excellencies of the parent; and no improvement in a good point, already possessed to a considerable extent, can compensate for the introduction of an obvious blemish.

On this principle of selection the breeder will continue to proceed, if his flock is tolerably large, and he will even be jealous of the introduction of a foreign breed. The good qualities of his sheep, transmitted from one generation to another, are no longer accidental circumstances. They have become a part and portion of the breed, and may be calculated upon with the greatest degree of certainty. They constitute the practical illustration of the term *blood*. It would be long ere the good qualities of a stranger would form an identical portion of the sheep; and no animals will elsewhere thrive so well, or improve so rapidly, as on the pastures on which they and their forefathers have, generation after generation, been accustomed to wander.

But, after awhile, with a considerable degree of certainty in a small flock, and too frequently in a larger one, the sheep will continue to arrive early at maturity, and to fatten as kindly as before, or even more so, but they evidently are decreasing a little, and yet only a little, in size. They do not bear the severity of the weather quite so well, and perhaps they are

somewhat more subject to disease. The farmer will do well to take warning. He has been breeding too long from close affinities; and he must introduce a little different and yet congenial blood. He must select a ram from a soil, and kind of food, not dissimilar to his own, although at a distance perhaps as great as convenience will permit—with points as much resembling his own sheep as may be,—quite as good as those in his own flock—superior if possible in some points, and inferior in none, and he must dismiss his own ram for one year and make use of the stranger. His purpose will be completely answered. He will have infused a tone and vigour among his sheep—they keep their propensity to fatten, and they re-acquire that health and hardiness which they used to exhibit, and the farmer is enabled to go on satisfactory for a certain number of years; when experience will tell him that a stimulus, in the form of a little foreign blood, is again wanted. Thus is illustrated that axiom with regard to all our domesticated animals—" selection with judicious and cautious admixture, is the true secret of forming and improving a breed." The errors to be avoided are too long-continued and obstinate adherence to one breed; and, on the other hand, and even more dangerous, violent crosses, in which there is little similarity between the soil, the pasture, or the points and qualities of the animals that are brought together *.

The ewe is sufficiently matured for breeding at fifteen or eighteen months. The old farmers did not employ them for this purpose until after the second shearing; but the improvement in the breed, which develops so soon a disposition to fatten, and prepares them so much earlier for the market, hastens also the development of the generative powers in the sheep.

The ewes and rams being kept in different pastures, the farmer can select his own time for bringing them together, and consequently, the time for yeaning; and that will depend on various circumstances. Where there is a demand for house-lambs, or the farmer adopts the rearing of such lambs as a part of his system of management, the period of yeaning should commence as early as September or October, in order that in November and December the lambs may be ready for the market, and, at which time they will obtain a good remunerating price.

In the general course of breeding, however, it is desirable that the lambs should not fall until the cold of winter is over, and the pasture begins to afford some food for the little ones. This is peculiarly important in bleak and exposed situations. Thousands of lambs die every year from the cold to which they are exposed as soon as they are yeaned. On the other hand there may be some inconvenience and danger if the period of lambing is too late. Hot weather is as fatal to the mother as cold is to the offspring. It frequently induces a dangerous state of fever; and both the mother and the lamb may be then injured by the luxuriance of the grass. If the lamb falls late in the season, it will be longer ere the ewe can be got ready for the butcher, and the ground cleared for other stock—and, in addition to this, the early lambs become larger and stronger and better able to resist the cold of the succeeding winter. The yeaning time will, therefore, be regulated by the situation of the farm, the nature of the pasture, and the demand from the neighbouring markets. It will seldom, however, commence before the middle of March, or be postponed beyond the middle of April.

The duration of pregnancy is about five months or 152 days, and that

* See Quarterly Journal of Agriculture, Sept. 1836, p. 250. Low's Elements of Agriculture, p. 492, and Dickson's Practical Agriculture, vol. ii, p. 639.

with comparatively trifling deviation *. The time for putting the ram with the ewes will therefore be from the middle of October, to that of November. No preparation is necessary, except, for a few weeks previously, to place the ewes on somewhat better pasture than usual. Before the ram is admitted the farmer should always fold and examine the ewes, first as to their possessing that form and appearance that are likely to perpetuate the breed which he is desirous to possess, and secondly, to ascertain whether they are in good health, the proof of which will be the whiteness and firmness of their teeth, the sweetness of their breath—the brightness of the eye and of the countenance, the degree of fat which they carry, and the firmness with which the wool adheres to the pelt. Every inferior or diseased ewe should be separated from the rest, and prepared, as speedily as may be, for the butcher.

In consequence of the new system of breeding and management, the ram will be sufficiently matured at the same age as the ewe; but it will not, perhaps, be prudent to allow him so many ewes as would be placed with one of greater age. The number should be somewhat regulated by the apparent health and strength of the animal, and the pasture from which he comes. Forty or fifty ewes may be allowed to the sheerling, and seventy or eighty to the older ram†. The practice of worrying the ewes with dogs, or employing a teaser—have deservedly fallen into considerable disuse. It was formerly the custom to *raddle* the ram, or rub a little red ochre on him from his brisket to his belly, and repeat this daily for a fortnight. If the marked ewes still continued in blossom and followed the ram, it would show that they had not been impregnated by him, and experience proved that if the first connexion was not successful no other would, generally speaking, be so with the same ram. This ewe would then, probably, be put with another ram, or another ram would be selected to take the place of the first in the ewe-flock.

The ram having been put with the ewes, the owner should visit the inclosure once or twice every day. During the first four or five days the ewes will be seen flocking around him, and following him from place to place; but if this long continues there will be reason to suspect that he is incompetent to his duty, and the owner will probably be disposed to remove him, or to place a younger ram in the same fold with him, who, although he may be persecuted and driven about by the first, will find opportunity to impregnate those ewes with whom the other has failed. At the expiration of the third week, the first ram, whether he appears to have discharged his duty

* M. Tessier presented a valuable memoir to the Royal Academy of Science in Paris containing his observations on the period of pregnancy of almost every domestic animal. Out of 912 ewes the shortest period was 146 days, and the longest 161, being a difference of 15 days; but more than three parts of them yeaned between the 150th, and 154th day after impregnation; bringing the average as nearly as possible to 152 days, or five calendar months, or twenty-one weeks and five days.

There is a singular case on record of a ewe exhibiting every sign of approaching parturition, and even the peculiar membrane protruding and breaking, and the water escaping. No assistance, however, was rendered to her, and the fœtus was retained. Her health did not appear to be materially affected, and two years passed on, at the expiration of which period she died. A full grown lamb, and not at all putrid or decomposed, was found within her.—Réc. de Méd. Vét. 1824, p. 155.

† Mr. Parkinson, who allots the same number of ewes to a ram as a general rule, speaks of one which he hired from Mr. Chaplin, at the time when the system of letting was first established, and to which he had put no fewer than nine score of lambs, and they all proved in lamb except one.—Parkinson on Live Stock, p. 276. This is, however, very bad practice, and a puny and almost worthless breed would result from overtaxing the powers of nature.

or not, should be removed, and another put in his place. By this means all except the barren ewes will certainly be impregnated.

MANAGEMENT OF THE EWE DURING PREGNANCY.

The rams having been finally parted from the ewes, some little attention should be paid to the latter. They should be driven gently to and from the fold; no dogging should on any account be allowed; they should be separated from the rest of the flock, and, if possible, a sheltered and tolerably good pasture should be allowed them. If the convenience of the farmer requires it, they may have turnips, or mangel-wûrzel, or other green food in the winter; but they must not be suffered to gorge themselves; nor indeed should any food, or quantity of food be given to them, by means of which their condition may be materially or scarcely at all increased. It has been supposed by some breeders that, because the ewe is with lamb, an additional quantity of food, and of more nutritive food, should be allowed—nothing can be more erroneous or dangerous, both to the mother and the offspring. There will be too many causes of inflammation ready to act, and to act powerfully, during the time of going with lamb, to permit the least approach to excess of food.

ABORTION.

One of the evils to be dreaded is premature labour. The ewe is not so subject to this as the cow; but there are occasional instances of it. Fortunately, however, it is not so infectious—if this term may be used—it does not spread so rapidly through the flock as through a herd of dairy cows. The causes of abortion are various, and some of them as contrary as possible in their nature. It may arise from starvation, and especially when a cold winter succeeds to a wet summer and autumn. It is also produced in the open and neglected part of the country, from continued intercourse with the ram after the period of gestation is considerably advanced. This is frequently the case among the mountain and the moor sheep. It has often been known to follow the incautious and hasty driving of the sheep into the fold in the later period of pregnancy. A leap over a ditch or a low gate has been followed by abortion, and so has a sudden fright when a dog addicted to worrying sheep has suddenly made his appearance in the flock.

Some very intelligent flock-masters have assured the author that they have attributed it, and satisfactorily so, to the too liberal use of salt. They had adopted the modern and judicious practice of putting salt within the reach of the greater part of their flock, and particularly of those that were supposed to be affected with the rot. A portion of the flock had not access to the salt. Some cases of abortion had occurred in the flocks of all of them, but it was almost confined to those ewes that had partaken of the salt. One gentleman told the author that he had given two ounces of common salt, with a little ginger, to a pregnant ewe that was dull and off her food, and that she aborted twelve hours afterwards. Here was a striking coincidence in point of time, but it must be left for future experience to determine how far this, generally speaking, invaluable medicine may be injurious to the pregnant ewe. One favourable circumstance may be stated—that when abortion occurs, from whatever cause, it is rarely fatal to the ewe.

There is one singular and too frequent consequence of abortion, namely, the detachment of a portion, or of almost the whole of the wool, during the following spring.

There are few symptoms that designate the approach of abortion in the sheep until it is too close at hand to be prevented from occurring. A

degree of dulness and of disinclination to food, and a frequent or almost continual bleating, followed by the discharge of a glairy, or yellow, or red, and fetid discharge from the vulva, would sufficiently indicate it, but being so near at hand as not to be arrested in its course. Were it not for the woolly covering of the ewe, the cessation of the motion of the fœtus, and the sudden falling of the belly, would leave no room for doubt.

The consequence of abortion is uniformly the death of the lamb. In the majority of cases this occurs some hours or days before the fœtus is parted with; in a few instances the lamb is born alive, but it dies in a very short space of time afterwards.

The treatment after abortion will depend entirely on the circumstances of the case. If the fœtus had been long dead—proved by the fetid smell of it, and of the vaginal discharge—the parts should be washed with a weak solution of the chloride of lime; some of which may also be injected into the uterus. If fever should supervene, it should be met by the treatment already recommended for that form of disease. If debility and want of appetite should remain, a little gentian and ginger, with small doses of Epsom salts, will speedily restore the animal, care being taken that the food shall not be too nutritive, or too great in quantity.

THE LAMBING.

The 152nd day from the admittance of the ram among the flock now approaching, some have recommended that the ewes should be put on better pasture, in order that they may have sufficient strength at the moment of yeaning, and that there may be an adequate supply of milk for the support of the lamb. If, however, she has during her pregnancy been placed on tolerably fair pasture, and is now in moderate condition, this stimulating system is to be deprecated as fraught with evil. Few ewes have sunk under the labour of parturition, unless they had been previously half-starved; and it is seldom that nature fails to supply sufficient nutriment for the young one: but many a ewe has been lost by means of that inflammation for which the stimulating plan lays the almost necessary foundation, and thousands of lambs have been destroyed by a flush of too nutritive milk, of which their weak powers of digestion could not dispose. Many a grazier has sustained considerable loss from having lambed his ewes thinly on strong land, but few have suffered who have placed them more thickly on the pasture.

The ewes should be removed as near to home as convenience will permit, and, according to the quality of the pasture, should occupy as little space as possible, in order that they may be more under the immediate eye of the lamber.

The process of *clatting* should now commence. The ewes should be driven into a fold, and the hair removed with the shears from under the tail and the inside of the thighs and around the udder. Without this many a lamb would be prevented from sucking by means of the dirt and filth which had accumulated around these parts; and, after the clatting, the lamber will be more readily able to distinguish the ewes that have lambed. This is a matter of some consequence, for it will not unfrequently happen that the young ewes will desert their lambs, and graze among the others as careless and indifferent as if nothing had happened. The barren ewes will also be readily detected and separated.

Some farmers *clat* the ewes before the ram is admitted into the field, but this is an exceedingly bad practice. The winter is approaching; the ewe will be uncomfortable and cold, and, occasionally, garget, and inflammation

of the womb, and abortion, and death, will be the consequence of this thoughtless and cruel exposure.

The lamber should now be on the watch day and night. The farmer himself should superintend, or assist in the duties of this season. Few of them are sufficiently aware of their interests here, or the immense losses which they sometimes sustain from the carelessness, or impatience, or brutality of the lamber. "Many lambs," says Mr. Price, in that most interesting part of his valuable treatise of sheep—the management of the ewes and their progeny during the lambing season—"may be lost without it being possible to charge the lamber with neglect or ignorance, although greater attention on his part might have saved many that otherwise perish. The practice of lambing is at times very intricate, and is apt to exhaust the patience of a lamber. Sheep are obstinate, and lambing presents a scene of confusion, disorder and trouble, which it is the lamber's business to rectify, and for which he ought always to be prepared. Some of the ewes perhaps leave their lambs, or the lambs get intermixed, and the ewes that have lost their lambs run about bleating, while others want assistance. These are only a few of the various occurrences which call for the immediate attention of the lamber*," and which render it necessary that the owner of the sheep should be on the spot, and should superintend the whole concern. "In the year 1805," continues Mr. Price, "I mentioned this to one of the greatest sheep-owners on the Marsh, and who said that he would watch the lamber more attentively than ever; and the consequence was that in the following spring he was more successful than he had been in any one of the preceding twenty-five years." Another master, pursuing the same plan, saved 200 pairs of twins out of 800 ewes, whereas he had never before saved more than 100, and, in some years, not more than one lamb to each ewe.

There is one custom, which has been hinted at in a former part of this work, and that should be for ever abolished—the skins of the dead lambs becoming the perquisite of the lamber. It would be unfair and unjust to charge the lamber with being generally dishonest; but he should not be exposed to the temptation of becoming so: his interest should be inseparably united with, and not in opposition to, that of his master.

THE IMMEDIATE PREPARATION FOR LAMBING.

The time of lambing nearly approaching, and the lambing field having been selected, a small pound or folding-place should be enclosed in the most sheltered corner of it, into which the ewes and lambs that require assistance may be driven. The fences, and particularly the ditches, should be well examined, and if there is water in the ditch the bank of it should be carefully guarded. The ewes often select the side of the hedge or ditch to lamb on, because it is usually barer of grass than most other parts of the field. Except precaution has been taken, these will be found exceedingly dangerous spots, for the lamb, when rising, may stagger back into the ditch, and if he does so he will certainly be drowned. If there is the least danger attending any part of the ditch, and a ewe seems to have selected that for her place of yeaning, she should be driven from it again and again, and especially when the lambing field is left for the night.

Another and smaller field, and with somewhat better pasture, should also have been selected, into which the ewes that may have twins may be turned. There will be less of the confusion which often occurs among

* Price on Sheep, p. 115.

these twins, and the ewe will be better enabled to provide for her double progeny.

The lamber should have with him his lamb crook; a bottle of milk—ewes' milk if possible, and carried in his bosom or in an inside pocket, that it may be kept warm; some cords to tie the legs of the ewes that he may have occasion to assist or to examine; a little pot of tar, with two or three small marking-irons, that he may place a different mark on each pair of twins, in order that he may be enabled afterwards to recognise them; another little pot of grease or oil, to lubricate his hand, if he should have occasion to introduce it into the womb of any of the ewes; a sharp knife, with a round or rather curved extremity, should it be necessary to remove the lamb piece-meal from the mother; a piece of stout polished iron rod, of the size of a goose-quill, twelve inches in length, and rounded at one end, somewhat like a button-hook, in order to remove from the womb a dead or divided fœtus; a sheep's drenching-horn; a small bottle of cordial, consisting of equal parts of brandy and sweet spirit of nitre; and a strong infusion of ergot of rye.

If the ochre had been applied to the ram, and the order in which the ewes were stained by it had been noted, he would be aware what ewes required the earliest watching. This is seemingly a trifling thing, yet may be the cause of many a lamb being saved in the course of the season. As he goes his rounds among them he should raise every ewe that appears early in the list, and which he finds lying down, and he should observe whether there are about her any symptoms of approaching labour; and as the ewe-flock had previously been kept as free from disturbance as possible, he should now approach them with additional care and tenderness.

In the more open parts of the country, the ewes, as the yeaning time approaches, should be folded every night. With commendable humanity and prudence too, the hurdles are frequently guarded with straw. Mr. Price says that he knew a grazier who used boarded hurdles as a protection to the lambs, and they were lambed in folds, the lamber attending on them during the night. When he lived in Herefordshire the ewes were driven into cots every night during the lambing. They were turned out in the day into an adjoining pasture, and had peas and straw, and sometimes turnips given to them during the night*.

THE LAMBING.

The period of lambing having commenced, the attention of the lamber should be increased. He should carefully observe every ewe that appears to be in labour. While she walks about and does not exhibit any extraordinary degree of suffering, he should not interfere; nor should he do so if she rises when he approaches, and walks away, unless her labour has been protracted twenty hours or more. He should not be in haste to render his assistance, although she should be continually lying down and getting up again, and showing more impatience or irritability than actual pain: but if her strength appears to be declining, his immediate aid is required. If he has to drive her to the fold or pound, it should be as gently as possible, or he should drive some others with her, in order that she may not be

* Price on Sheep, p. 153. For many of the observations on the treatment of the ewe and the lamb during the time of yeaning, the author acknowledges himself indebted to this valuable work. It is the only original modern work on this subject. In some important points, however, he has ventured altogether to differ from Mr. Price. This gentleman professes to treat of the management of the Romney Marsh sheep alone; but there is that in his work which claims for it a place in the library of every sheep-owner.

frightened by being alone selected. The early interference of the lamber is always prejudicial, and very frequently fatal. Nature, in the course of twenty or twenty-four hours will, in the great majority of cases, accomplish that which cannot be hurried on by art without extreme danger.

The state of the weather will cause a very considerable difference in the duration of the labour. When the weather is cold and dry, and especially if the situation is somewhat exposed, the progress of the labour will be slow—the throes will be comparatively weak and ineffectual, and the ewe may and should be left a considerable time before mechanical assistance is rendered. When, however, the weather is warm, and especially if, at the same time, it is moist, the throes will be violent, and the strength of the sufferer will be very rapidly wasted; there will be a dangerous tendency to inflammation, and the aid of the lamber is speedily required. Except under these circumstances, no motive of curiosity, no desire to know how the affair is going on, should induce the lamber to interfere while the throes are natural and the strength continues, unless it is evident, without handling the ewe, that a false presentation, or some mechanical cause, prevents the expulsion of the fœtus. When the ewe is nearly exhausted, she will often suffer the lamber to kneel beside her and successfully afford the requisite assistance. If there is a violent struggle between the patient and the lamber, the fœtus will often be destroyed; but his help, when she quietly submits to him, will rarely fail to preserve the mother and her offspring. Let it be supposed that, from certain circumstances, she is driven to the pound, or that she is lying quietly by the lamber in the field. He should first endeavour to ascertain the nature of the presentation. Is the lamb coming the right way, with its muzzle first and a forefoot on each side of it? If the tongue is not protruding from the mouth and becoming almost black, and her strength is not quite wasted, a table-spoonful of his cordial, with double this quantity of the infusion, will probably increase or recall the pains; and the lamb will soon be born. If this is not effected in a quarter of an hour, a second dose of the infusion should be given; and, that being followed by no good result, he should try what mechanical assistance will do. He should draw down first one leg and then the other, endeavouring with his finger to solicit or coax the head onward at the same time. If he cannot readily get at the legs, he should push the head of the lamb a little backwards and downwards, when he will probably be enabled to grasp them. If he does not now succeed, the cause of the obstruction will be sufficiently plain, namely, the too great largeness of the head, which cannot readily pass the arch of the pubis; and, therefore, either tying the legs of the ewe, or an assistant keeping her down on her right side, the lamber should grasp the two fore-legs in one hand, and, with one or two fingers of the other, introduced into the vagina by the side of the head, urge it forward with as much force as is consistent with the safety of the lamb. The young one will rarely fail to be extracted by these means, except the head very much exceeds the common size. An account of the occasional losses sustained by reason of the large heads of some breeds has already been given in page 371.

The false presentations are not numerous in the ewe, and they are usually accounted for with tolerable readiness. When the ewe in-lamb has been violently hunted by a dog—whether occasioned by the thoughtlessness or brutality of the shepherd, or his boy, or the natural ferocity of the animal—it may be readily conceived how much the situation of the fœtus may be disarranged by the leaps and falls of the sheep. The author has more than once fancied that he could trace a connexion between the unnecessary and

rough handling of the shepherd, in the early period of parturition or before the commencement of it, and an altered position of the fœtus. The clatting is a necessary operation, but there needs not a tenth part of the violence that is sometimes used. The connexion between these circumstances is of so frequent occurrence, that, on this account alone, some sheep-masters defer the clatting until after the dropping of the lamb.

The most usual false presentations are,—the side of the lamb pressing against the mouth of the womb, which may be readily detected by feeling the ribs—or the back, and then the bones of the spine can scarcely be mistaken—or the breech, when the bones of the haunch will be immediately recognised. The hand, well oiled or greased, should be introduced into the vagina, and, the fœtus being pushed a little back, one of the legs will probably be felt, and may easily be drawn into the passage. Being held there with the left hand, the corresponding leg must be got at likewise, and brought into the passage; after which the delivery will usually be effected without any great degree of trouble. The most dangerous presentations, and the most difficult to manage, are the crown of the head and the breech. In both cases the lamb must be pushed back into the womb. The head must then be raised with the fingers, and brought into the passage in the former case, and in the latter the lamb must be pushed far enough into the womb, to enable the shepherd to bring down the hind-legs, a work not always easily accomplished, or to be accomplished at all, on account of the manner in which they are extended under the belly. The principal loss in lambing is to be traced to one or the other of these presentations, and chiefly to the latter.

The lamb having been placed in its natural position, and the labour pains being strong, much may be left to nature; the strength of the animal being supported, and the pains rendered more regular and effective by small doses of ginger and the ergot of rye. The position, however, being unnatural, manual assistance cannot be too early afforded. The lamber should not use more force than is absolutely necessary in order to draw away the lamb; yet a considerable degree of it may be quietly employed without endangering the life of either the mother or the offspring. If the ewe is nearly exhausted, the application of this force is imperiously required.

Difficulty sometimes occurs in cases of twin-lambs. They may both present at the same time, either naturally or otherwise. The one that is least advanced must be returned, and the other extracted as speedily as circumstances will permit. The lamb that was returned may then be left to the power of nature, and will speedily follow.

As soon as it can be ascertained that the lamb is dead within the mother, means must be taken for its extraction. There are instances in which the dead lamb has been retained in the womb during a considerable period of time, or, even during the life of the mother, but they are rare; the animal has seldom thriven well; and, in the greater majority of cases, she has pined away and died. The fœtus may sometimes be extracted by the hand; at other times a blunt-pointed knife, and an instrument somewhat resembling a large button-hook, are necessary.

THE CÆSARIAN OPERATION.

Supposing, however, that the lamb is strong and lively, and the mother is not quite exhausted—but it is evident, from the size of the lamb, or from peculiarity of position, that it cannot be extracted alive, but that both the offspring and the mother must be destroyed—supposing also that the breed is valuable,—would the opening of the belly of the mother, and the extraction

of the lamb through the opening, be warrantable? The Cæsarian operation, as it is called, has been performed on the human female, and in a few cases with success. It has also been attempted on the quadruped, and would oftener be so, were the veterinary surgeon supposed to know anything respecting the diseases of sheep.

There are two cases on record in which it was performed on the sheep. A four-year-old ewe was brought to M. Gohier, veterinary professor at Lyons. She had been in labour twelve hours. The pains were now rapidly becoming weaker, and she was nearly exhausted. From malformation of the parts it was, after numerous trials, and which completed her exhaustion, found to be impossible to deliver her: the lamb also was dead. It was determined, as the only chance of saving her, to attempt this operation. An incision, five inches long, was made in her flank; the mass of the intestines was pushed aside; an incision of the same length was made into the womb, and the fœtus and the placenta extracted. The intestines were then replaced, the wound closed by several sutures, and a bandage passed round the belly, and over the wound. The operation was unsuccessful, and it had been attempted too late, for the powers of life were exhausted, and the poor animal died on the following day*.

On the other hand, the following account appeared in the Farmer's Journal, May 26, 1823:—"On the 8th ult. a ewe, the property of Mr. W. Pickering of Kettering was in labour. W. Dexter, the shepherd, not being able, with proper assistance, to bring the lamb forward, opened the ewe, and took out the lamb alive; he afterwards replaced the intestines, sewed up the wound, and carefully dressed her. In a short time the ewe grazed as before the operation, and, six weeks afterwards, both the ewe and her lamb were doing well."

In cases, then, of imperative necessity, and when the death of the mother would otherwise be inevitable, this operation is admissible.

In some lambs that are born apparently dead, the vital principle is not extinct, but it soon would be so if the little animal were suffered to remain on the cold damp grass. Every lamb that is found in this situation should be carefully examined, and if there is the slightest degree of warmth remaining about it, the shepherd should blow into its mouth, in order to inflate the lungs: many a little one has been thus saved.

The lamber needs to trouble himself very little about the expulsion of the placenta, or *cleansing*, although a day or two may pass before it is detached. A couple of ounces of Epsom salts, with a little ginger, may be given if there should be a longer delay, or if symptoms of fever should be exhibited, but the farmer will do well to avoid the rough barley, or the misletoe, or, in fact, any stimulant, for there is at this time sufficient disposition to fever, without its being artificially set up.

INVERSION OF THE WOMB.

The womb will occasionally be protruded and inverted after a labour of unusual severity, or when great violence has been resorted to in extracting the lamb. It is usually returned as gently and as speedily as possible, and confined in its situation, either by a suture, or by a little iron ring passed through the lips of the external parts. The ring is the surest method, for the twine or thread may cut through the lips of the orifice; and in some cases it is long before the uterus, although carefully returned, will remain in its natural situation.

* Mémoires et Observations sur la Chirurgie Veterinaire, by J. B. Gohier. Tome I. 41.

The French place a *pessary* high up in the vagina, and secure it in its situation by means of the suture or ring. This renders the thing somewhat more secure. A far better operation would be, not to return the womb at all, but to tie a strong ligature round the protruded parts, as near to the mouth of the vagina as possible. The uterus will slough off in the course of two or three days. There will be no bleeding or the slightest inconvenience, and the ewe will become as healthy and as fat as any of the flock*.

Every ewe from whom the uterus has protruded should be fattened for the butcher as soon as she has reared her lamb.

INFLAMMATION OF THE WOMB.

The ewe is subject to two species of inflammation of the womb, one before and one after lambing. The first disease, which is primarily inflammation, rapidly degenerates into dropsy. It usually begins about a month before lambing. Sometimes the ewe increases in size until the weight becomes insupportable, and then she dies from weakness, before, or shortly after, parturition. In other cases, when slightly affected, she recovers; but the disease seems to have extended to the lamb, which, although it may appear strong when it is first dropped, soon refuses to suck, and dies on the first or second day; and, when examined, is found to contain considerable fluid in different parts of the abdominal cavity. The shepherds term them *water-bellied lambs*. The loss of lambs in this disease, either from bad feeding or some epidemic influence, or both, has occasionally amounted to 10 or 15 per cent. Remedy there is none; for the nature of the disease is scarcely discovered ere the animal dies. The preventive may be, the withholding of the dangerous quantity of turnips that is sometimes allowed to ewes at this time, and the substitution of a corresponding portion of dry food.

The inflammation of the womb after parturition usually comes on between the first and the fourth day, and especially when any violence has been used in extracting the lamb. It is a most fatal disease, and speedily runs its course. The treatment should be, bleeding and purgatives of Epsom salts. On some farms the loss of ewes from this disease has been two or three per cent†.

AFTER-PAINS.

Connected with the last disease, or a variety of it, are the after-pains or heaving to which ewes are subject, and which are frequently severe and destructive. They are apparently the same pains, but considerably stronger, which nature uses to expel the lamb.

Mr. Price says that a farmer on Romney Marsh lost several ewes in 1806, in the latter part of the lambing season. They lambed without any assistance, but they were afterwards seized with heaving pains. He had removed them from poor to rich keep. Another grazier had thirteen ewes to lamb, during the latter end of the lambing season. The weather became warm, and the grass was luxuriant, and he lost eleven of them from heaving.

This disease is evidently produced by the ewes being too well kept during their pregnancy. It cannot be too often repeated, that it is a fatal error to overfeed the ewes at this period, with the view of giving them strength to support their approaching labour. It is a most unscientific and injurious practice, and severely does the farmer suffer for it. But there is some epidemic influence also at work, or the constitution

* Proceedings of the Zoological Society for 1830, p. 30.

† Mr. Clarke on Inflammation of the Uterus in Sheep.—Veterinarian, viii. 507.

of the sheep is at that time irritable almost beyond belief; for Mr. Price adds, "This inflammation takes place sooner or later, according to the extent of injury received during parturition, or the condition of the body, or the nature of the keep, or the state of the weather; for I have seen ewes, kept alive a long time from the wind being in the north, perish the moment it changed to the south *."

MONSTROSITIES.

Although not so subject to strange variations from the usual form as are swine, cats, and some other animals, the sheep have occasionally strange malformations or multiplications of certain parts—a duplicature of heads, a duplicature of bodies, and a multiplication of legs, have not unfrequently been seen. The lamber should not be unmindful of this in cases of long and difficult parturition. The introduction of the hand will usually detect any circumstance of this kind; and the lamber should immediately adopt the proper course of treatment. A misshapen animal is a worthless one, except for the museum of the curious; therefore, at all hazard to the fœtus it must be immediately removed by the hand, if possible, or, if that cannot be accomplished, by the agency of the knife.

CARE OF THE LAMBS.

It is the duty, and would be the interest, of the farmer, to attend to the comfort of his ewes and lambs at this period; therefore the lambing-field should always be a sheltered one, and there should be a temporary or a permanent retreat for the weakly and the cold. The first care of the shepherd therefore should be to examine the newly-dropped lambs. If they are chilled and scarcely able to stand, he should give them a little of the milk, which he carries always with him, and then take them to some shelter, or place them in a basket well lined with straw. Nursing of this kind for an hour or two will usually give the animal sufficient strength to rejoin its mother.

Nature has given to the sheep, as well as to other animals, an instinctive and strong affection for its young; an affection which strengthens in proportion to the necessities of the parent and the offspring. It has already been remarked (p. 375) that the more inhospitable the land is on which they feed, the greater their kindness and attention to their little ones: nevertheless it will occasionally happen that the young ewe, in the pain and confusion and fright of her first parturition, abandons her lamb. Some, when the udder begins to fill, will search it out again, and with unerring precision—others, severed from their offspring before they had become acquainted with its form and scent, are eagerly searching for it all over the field with incessant and piteous bleatings. Some will be hanging over their dead offspring, while a few, strangely forgetting that they are mothers, are grazing unconcernedly with the rest of the flock.

There is another circumstance that adds to the confusion. Some of the ewes have had twins; they have inadvertently strayed from one of them, or stupidly or capriciously have driven it from them; and the neglected one is wandering about, vainly seeking its parent, or angrily repulsed by it.

The first thing a lamber has to do is to remedy as well as he can this confusion. He first seeks out for those that have twins, and that have recognised both of their lambs, and, taking his little marking-bottle and marking-iron, he puts a particular mark on each of the twins, by which he may

* Price on Sheep, p. 142.

again recognise them, and on each pair he puts a different mark. If they are just dropped, and are weak, he leaves them for a while; but if they are able to travel a little, he drives them into a pound, or into a corner of the field with the other twins, or he at once removes them into another and somewhat better pasture, which he had destined for the twins.

He then looks for the lambs that have apparently been abandoned by the mother, and if, as he takes one of them up, it bleats, he will presently find whether there is any responsive call or gaze of recognition. If the mother eagerly calls to it, he has but to put it down, and she will speedily rejoin and suckle it, if it is strong enough to raise itself from the ground for this purpose. If the animal is almost exhausted, he must catch the ewe, and assist her to suckle the lamb. It will soon revive, and her love for it will revive too. If she merely gives a careless look of recognition, he must suckle the lamb from his bottle of ewe's milk, and leave it for a while; perhaps her affection will return when her udder begins to be distended with milk: if not, he must drive her with others into a fold, and, suffering the rest to escape, try every means to induce her to let the little one suck. There may be considerable difficulty in this at first, but, by the exercise of some patience and tact, he will generally succeed. After all, however, he will probably have some lambs upon his hands for whom he cannot find a mother, or whose own mother will not suckle them.

On the other hand, he will find some ewes who are gazing mournfully on their dead lambs. With some contrivance he will generally find in her a foster-mother for one of his abandoned ones. He ties a piece of cord round the hind feet of the dead lamb, and the mother, if she has not been unnecessarily frightened by the lamber or his dog, will follow for miles with her nose close to the lamb, and may be led wherever the shepherd chooses. An instance of this has been related in page 376.

AFFECTION IN THE EWE FOR HER LAMB.

The Ettrick Shepherd tells another story of the continued affection of the ewe for her dead lamb. "One of the two years while I remained on the farm at Willenslee a severe blast of snow came on by night, about the latter end of April, which destroyed several scores of our lambs, and as we had not enow of twins and odd lambs for the mothers that had lost theirs, of course we selected the best ewes and put lambs to them. As we were making the distribution, I requested of my master to spare me a lamb for a ewe which he knew, and which was standing over a dead lamb in the end of the hope, about four miles from the house. He would not let me do it, but bid me let her stand over her lamb for a day or two, and perhaps a twin would be forthcoming. I did so, and faithfully she did stand to her charge. I visited her every morning and evening for the first eight days, and never found her above two or three yards from the lamb; and often as I went my rounds, she eyed me long ere I came near her, and kept stamping with her foot, and whistling through her nose, to frighten away the dog. He got a regular chase twice a-day as I passed by; but however excited and fierce a ewe may be, she never offers any resistance to mankind, being perfectly and meekly passive to them.

"The weather grew fine and warm, and the dead lamb soon decayed; but still this affectionate and desolate creature kept hanging over the poor remains with an attachment that seemed to be nourished by hopelessness. It often drew the tears from my eyes to see her hanging with such fondness over a few bones, mixed with a small portion of wool. For the first fort-

night she never quitted the spot; and for another week she visited it every morning and evening, uttering a few kindly and heart-piercing bleats; till at length, every remnant of her offspring vanished, mixing with the soil, or wafted away by the winds*."

THE SUBSTITUTE LAMB.

The bereaved and affectionate ewe is induced to follow the remains of her little one to the lambing pound, or to some other convenient place. A lamb that has lost, or been abandoned by its mother is then selected. The head, tail, and legs of the dead lamb are cut off—an incision is made along the belly, and the body turned out, and this skin is then drawn over the substitute lamb. The body of the dead lamb is opened, the liver taken out, and the head and legs of the living lamb, and what other parts the skin does not cover, are smeared with the blood. In the darkness of the night, and after the skin has been warmed on it, so as to give something of the smell of her own progeny, the substitute is put to the bereaved ewe. In the majority of cases the fraud is altogether successful, and the impostor is at once received and fondled and suckled. This being effected, the shepherd hastens to remove the false clothing; the lamb is returned to her, and "whether it is from joy at this apparent reanimation of her young one, or because a little doubt remains on her mind, which she would fain dispel, cannot be decided; but for a number of days she shows more fondness by bleating over and caressing this one than she did formerly over the one that was really her own."

If she does not take to it at first, she must be compelled to suckle it, and confined, so that she shall not be able to kick or otherwise hurt it. In two or three days she will generally own it, and then they may be turned together into the field without any apprehension or trouble.

Care should, however, be taken that the age of the substitute lamb and that of the true one should correspond as much as possible. If a lamb lately dropped is put to a ewe whose young one would have been a week or two old, the milk will be too strong, and a purging will be set up, which, probably, no medicine can arrest. On the other hand, if the substitute lamb is a week or two old, and the foster-mother had lost hers in the act of yeaning, her milk will be injurious on account of that purgative quality by which the intestines of the newly-dropped lamb are first excited to action. Sometimes the foster-lamb, frightened or exhausted, will not readily take the teat, however disposed the ewe may be to adopt and feed it. Care should be taken to ascertain whether this is the case, and, if necessary, the lamb should be held while a little of the milk is pressed into its mouth from the udder. This will rarely need to be repeated, for instinct will teach it where to seek and how to obtain its proper nutriment.

AFTER-CARE OF THE LAMBS.

In the course of a little more than a week, the great majority of the ewes will have produced their young, and the lamber will have more leisure for those cases which particularly require his attention. The twin-field will particularly demand his care. He will seldom enter it on the morning without finding some degree of confusion. Some of the lambs will have strayed from or been abandoned by their mothers; and these twin-mothers are sometimes not a little capricious, and especially when, not having sufficient milk for the two, they are teased and worried by the incessant suck-

* Hogg's Shepherd's Calendar, vol. ii. p. 191.

ing of the twins. In such case they will, in the most determined and furious manner, repulse one of them. Amidst the intermingling of the offspring of the different ewes he will find the advantage of having marked the respective twins, and thus, although not always without regularly drawing them off, he will be enabled properly to separate the respective families: he will relieve the weakly ewe from a burden which she cannot support; and, on the other hand, he will reconcile the deserted little one to its unnatural parent, or find a better mother for it. The ewes with their single lambs will not, after the first few days, require any extraordinary degree of trouble, but those with twins must be carefully watched, at least until the lambs begin in good earnest to graze. Many a lamb has been stinted in his growth, and irreparably injured, by the insufficient supply of milk which the ewe with twins can afford.

TWINS.

This is the proper place to speak of the desirableness of having many twins. Most breeders are partial to them, on account of the apparent rapid increase of the flock, or the additional quantity of lambs that can be prepared for the market. The question depends entirely on the quantity of land which the farmer holds, and the nature of the soil. If he has pasture enough, and good enough, twins are highly desirable; for at only the usual expense before the yeaning time the number of his lambs is doubled, and, the pasture being good and the lambs well fed, there will be very little difference in health, condition, or value, between the twins and the single lamb.

The ewe has seldom twins at her first yeaning; and it is fortunate that she has not; for it is seldom that she has any great supply of milk then, and consequently the mother and her offspring would equally suffer. The twins are generally obtained from ewes that are three, four, or five years old. The disposition to twinning is undoubtedly hereditary. There are certain rams that have the credit of being twin-getters, and that faculty usually descends to their offspring; but this is oftener the case with regard to the ewe, agreeably to the old couplet,—

> "Ewes, yearly by twinning, rich masters do make:
> The lambs of such twinners for breeders go take."

The female of every species of animal has far more to do with this unusual multiplication of the offspring than has the male; and the farmer who wishes rapidly to increase his stock through the medium of twins, may go some way towards the accomplishment of his object by placing his ewes on somewhat better pasture, or allowing them a few turnips when November approaches. The old Teeswater breed used to be celebrated for the frequent occurrence of twins. The Dorset ewes often produce twins, which may be in some measure easily accounted for by the flush of grass at the period at which they couple. The South-Down ewes yield a fair proportion of twins. In 1804, 589 ewes, belonging to Mr. John Ellman of Glynde, produced 701 lambs; or in other words, 112 of the ewes had twins, being rather more than one in five. In 1806, however, in a flock of his, consisting of 252 ewes, 344 lambs were reared; or, without making any allowance for accidents, nearly one ewe out of three yielded twins. In the Account of the Romney Marsh Sheep, by Mr. Price, it appears that out of 3600 ewes that fell under his notice in one year, 775 had twins, or about one in five. Varying in different seasons, and with the condition of the animals when they couple, and particularly that of the ewe, this may be considered as about the usual average. Occasionally three, or more

than three lambs are dropped; and there are several instances on record of five lambs being yielded at one birth. Mr. Culley, an authority not to be disputed,‖ says that a Teeswater ewe "when two years old, in 1772, brought four lambs; in 1773, five; in 1774, two; in 1775, five; in 1776, two; and in 1777, two;" or twenty lambs in six years*.

Mr. Middleton, speaking of the same sheep, says, "with respect to these ewes, they usually bring two lambs each, at least the number of ewes that have but single lambs are so few that they are nearly equalled by those that bear three: but then the generality of ewes cannot suckle three lambs; however, that is possible, as a neighbour of mine has a ewe that often does it; and I have seen the three lambs sucking her at the same time, one standing on each side of her in the usual manner, and the third standing behind her†."

This must be bad practice. Few ewes are capable of suckling three lambs without essential injury to themselves and their offspring. The third lamb should always be removed, and a foster-mother provided for it. Mr. Middleton adds, that "about 36 or 38 lambs are usually reared from every score of breeding ewes, after allowing for accidental deaths‡."

Ewes are mostly drafted for fattening when they have had their third or fourth lamb. Generally speaking this is good practice; for at or before that time they will usually have lost the greater part of their teeth, and will

* Culley on Live Stock, p. 123.

† Annals of Agriculture, vol. xv. p. 502.

‖ The following extraordinary instances of fecundity should be placed on record:—

"A ewe, of the ordinary breed of the lower part of Berwickshire, produced, in 1803, four lambs; three in 1804; and four in 1806."—Kerr's Agricultural Survey of Berwickshire.

"In 1806, in a flock of Norfolk ewes, belonging to Mr. Wythe of Eye, one on the 18th of February yeaned three lambs; on the 20th another dropped three, and a third, five, on the 21st; a fourth, four, on the 23rd; and on the same day a fifth produced three. On the 25th, a sixth ewe dropped three lambs; and a seventh yielded four on the 27th. So that seven ewes yeaned twenty-five lambs, all of which were reared."—Annual Register, 1806.

"Last week a ewe belonging to Mr. Kitter yeaned five lambs; she also brought five lambs last year, and four the year before; *i. e.* fourteen lambs in three years, and not a weak or deformed one in the whole number."—Gentleman's Magazine, March, 1750.

"Mr. Meadows, of Salcey Forest, Northamptonshire, has a ewe which brought him three lambs in 1802; four in 1803; four in 1804; and four in 1805; being fifteen lambs in four years."—Agricultural Magazine, April, 1804.

An old book, entitled "The Gentleman Farmer, written by a Person of Honour," and in which are many excellent remarks on the sheep-husbandry of the seventeenth century, contains the following strange account (p. 15):—"They have in Flanders a kind of sheep, and particularly in a place between Vecue and Dixmeire, that ordinarily bring five or six lambs apiece, and by feeding the ewes with roots, and bringing the lambs to eat anything, they will all come to good." A great part, however, of the mystery is dispersed by the recollection that, at that time, it was the almost invariable custom in that part of the continent to obtain lambs from their ewes twice in the year: yet, after all, it is a remarkable instance of the fecundity of the breed. The custom of breeding twice in the year was never generally adopted in Great Britain. It occasionally happened, but mostly unsought for, among the Dorset sheep; and by some farmers it used to be followed on the Mendip Hills: but this was long before the present mode of breeding and grazing was adopted; and it is much to be questioned whether, even on the best land, the lamb or the ewe could be brought to compete with the improved and beautiful animal of the present day.

There is an instance on record of the power of thus producing two families in the year not being confined to the Mendip and Dorset breeds:—"In the spring of 1801, Mr. Sheriff, of Kinmyles, Inverness, bought a parcel of ewes in lamb, of the white-faced Highland breed. They lambed in March and April. One old ewe, without a tooth, dropped a second lamb on the 1st of November, 1801; a third on the 29th of April, 1802; and a fourth on the 12th of January, 1803; so that she reared four lambs at different times in the course of twenty-one months."—Agricultural Magazine, Feb. 1803.

find considerable difficulty in gathering sufficient food to keep themselves and their lamb; but there are frequent exceptions to this. Many ewes will retain a full mouth some years after this period; and if so, and they have been good and careful nurses, and have brought good lambs, and have large and sound udders, it would be bad policy to draft them; although there is no doubt that they would now fatten kindly and well, and that the propensity to fatten afterwards will somewhat decrease every year.

There are some interesting accounts of the age to which the ewe has been preserved, and usefully and profitably so. The reader is referred to two given on unquestionable authority:—"Mr. Geo. Moore of Winthorpe had on his pastures a ewe which yeaned a pair of lambs when she was a shearling, and had twins yearly for fifteen years. On each of the two following years she had single lambs*."

"Mr. Tamlyn, of Porlock, has at the present time (1837) a ewe of the Exmoor breed, which is now twenty-one years old, and which has produced altogether the extraordinary number of thirty-eight lambs†."

While, therefore, a ewe with valuable points about her, a sure breeder, and a good mother, exhibits no symptoms of disease or debility, it will, under many circumstances at least, be the interest of her owner to continue to breed from her.

THE MANAGEMENT OF THE LAMBS.

We return once more to the lambs, now a few days' old. The old ewes will prove assiduous and faithful nurses, but the young ones will occasionally wander from their lambs, and prove inattentive to, or have not recognised their bleatings. Such mothers must be separated from the flock, and folded and confined with their young ones, until they appear to be disposed faithfully to do their duty. Some lambs refuse the attention of the mother, and lie weak or sullen, and droop away and die. Some of the mother's milk should be frequently introduced into the mouth; and if that has not the desired effect, a foster-mother must, if possible, be found; or the little churl must be brought up by the hand. There will, generally speaking, be very little difficulty about this. If it is at first fed with warm sheep or cow's milk, by means of a spoon, until it is old enough to suck out of a sucking-bottle, it will soon begin to bleat for its food, and greedily meet the bottle the moment that it is presented to it‡.

The *cuckoo* lambs will require the particular attention of the shepherd. They are those that are dropped from the middle of April or the beginning of May, when the cuckoo is just making his appearance, and after whom they are named. They are usually the progeny of very young or very old mothers, who were not impregnated so soon as the others, and who generally are not so strong and so hardy as the rest of the flock. Care must be taken that they have sufficient, yet not too nutritive food; and that the diseases to which weakly lambs are subject are promptly attended to.

* Farmer's Journal, May 3, 1824.

† Farmer's Magazine, April, 1837.

‡ Old Ellis tells an interesting story about this. "A ewe brought three lambs at a time, and the brutal shepherd threw the third into the hedge, in order that there might be better room for the ewe's suckling the other two. A poor woman accidentally saw this, and begged the thrown-away lamb, and she employed her utmost care in nursing it with warm cow's milk, by means of the spoon and the sucking-bottle, and she reared it until it could feed upon grass, and shift for itself. She then turned it on the common with some other sheep belonging to her neighbours. It was a ewe-lamb, and in due time it brought her twins; and she raised a flock of sheep from this single ewe and her breed, and in process of time became a woman of worth."—The Shepherd's Guide, p. 78.

Some ewes will permit other lambs beside their own to suck them, and then there will possibly be one or more greedy lambs, who will wander about from ewe to ewe, robbing the rightful owner of the greater part of his share. He and his mother must be removed to another pasture, where he will soon learn to satisfy his voracious appetite with the grass.

As the shepherd takes his round he should inspect every lamb. If one does not appear to thrive, he should endeavour to ascertain the cause. Has the mother any or sufficient milk? Are the teats free from disease? He should either supply the deficient nutriment, or provide a foster-mother.

Does the milk disagree with the lamb? Is there any, or considerable purging? The calves' and sheep's cordial must be immediately resorted to; and, if necessary, nursing, or separation from the mother.

In two or three weeks, and often considerably sooner, the lambs will begin to nibble a little grass. Is it too luxuriant for them, or has it been eaten down close by the ewes, and is the owner thinking of providing a fresh pasture? Let him beware! There is no situation in which the old advice of not making "more haste than good speed" should be more carefully heeded than in this. If one paramount cause of disease, and fatal disease to lambs, were selected, it would be a sudden change from bare to luxuriant pasture. It often sets up a degree of inflammatory fever, which no depletion will extinguish, or a diarrhœa which no astringent can check. In that candid and invaluable record of the management of his breeding flock, in 1804, which Mr. Ellman published, we read,—"April 5th.—Lost a lamb at first eating of grass, when about three weeks old. 8th, Lost another lamb from the same cause. 9th, do.," and so on until the 22nd, when he had lost eight lambs.

The technical term which the shepherd applies to the lamb diseased from this cause is *gall-lamb*. The liver seems to be the principal seat of inflammation, and a great quantity of bile or *gall* is found in the duodenum and small intestines; a portion of it has frequently regurgitated into the abomasum or fourth stomach, and some has entered into the circulation, and tinged the skin and flesh of a yellow colour. It is a disease which very speedily runs its course; occasionally carrying off its victims in a little more than twelve hours, and seldom lasting more than three days. Immediate bleeding in the early stage, and afterwards Epsom salts, with a small portion of ginger, will afford the only chance of a cure. The poor animal is often condemned and slaughtered at once—that is barbarous work.

CASTRATION.

There is a great difference of opinion as to the time when the tup-lambs that are not intended to be kept for breeding should be castrated. Some recommend the performance of this operation as early as three days after the birth. Mr. Parkinson says that "he has several times cut a lamb the very day that it was lambed, when strong and healthy, and that he never knew one do ill from the operation." The proper period depends a great deal on the weather, and on the stoutness of the lamb, and varies from the third or fourth to the fourteenth or twenty-first day, the weather being cool or even cold*, and somewhat moist. It would be highly improper and dan-

* The following account by Mr. Parkinson shows the little danger that is to be apprehended from cold. "When I lived with my father, there happened, as we thought, a very unfavourable time for the castrating of lambs, it being cold and wet. One morning proving much finer, and as it was our custom to cut once a week at farthest, I embraced the opportunity, there being then more lambs than usual to cut, and castrated every lamb down to one day old. In the day it turned cold, with some snow, but

gerous to select a day unusually warm for the season of the year. The absence of unusual warmth, and the health of the animal to be operated upon, are the circumstances which should have most influence in determining the time.

There are two methods of performing the operation. The lamb being well secured, the operator grasps the scrotum or bag, and forces the testicles down to the bottom of it. He then cuts a slit across the bottom of the bag, in a direction from behind forwards, through the substance of the bag, and large enough to admit of the escape of the testicles. They immediately protrude through the incision, being forced down by the pressure above. The operator then seizes one of them, and draws it so far out of the bag that a portion of the cord is seen; and then, if he is one of the old school, he seizes the cord between his teeth and gnaws through it. This is a very filthy practice, and inflicts some unnecessary pain. The testicle being thus separated, the cord retracts into the scrotum, and is no more seen. The other testicle is then brought out and operated upon in a similar manner. Very little bleeding ensues—and the young one may be returned to its mother. An improvement on this operation, and which any one except of the lowest grade would adopt, is to use a blunt knife instead of the teeth. By the sawing action which such a knife renders necessary the artery is even more completely torn than with the teeth; and yet without so much bruising of the part, and probability of ensuing inflammation. It is by the laceration, instead of simple division of the cord, that after-bleeding is prevented.

Another way of performing the operation is to push the testicles up towards the belly, and then, grasping the scrotum, to cut off a sufficient portion of the bottom of the bag to admit of the escape of the testicles when they are again let down. They are, one after the other, pushed out, and taken off in the manner already directed. The wound is considerably longer in healing when the base of the bag is thus cut away, and the animal consequently suffers more pain. The first is the preferable way, if the incision is made sufficiently long to prevent its closure for two or three days, thus leaving an outlet for the escape of the blood and pus from the inside of the bag.

There is usually little or no danger attending the operation, and yet occasionally it is strangely fatal. In a whole flock not a single lamb will sometimes be lost; but at other times the deaths will be fearfully numerous, the same person having operated on both occasions. Much, probably, depended on some peculiar state of the atmosphere, of the actual nature of which we know nothing at all; and more probably might be connected with a disposition to inflammation in the patient proceeding from too high feeding, or from a debilitated state of the frame, and which had not been observed or properly estimated.

When fatal disease occurs after castration it usually assumes the form of tetanus, or locked-jaw. The village operator pretends to tell when this will or will not supervene. The usual struggles of the animal, or the usual expressions of pain, he does not regard: but when, as he is gnawing the cord asunder with his teeth, he feels a deep and universal shudder of the animal, he says at once that that lamb will die. He is often right about this, and when he is, it can be easily explained. By the fearful torture he

during the night there was a very heavy fall, so that many of the lambs that had been cut the day before were drifted up with the snow, among which we had them to seek, and even for several of the old sheep. I was much alarmed, thinking that they must all die, but not one of them was lost."—Parkinson on Live Stock, vol, i. p. 257.

has inflicted, he has caused a shock of the whole nervous system, from which the poor sufferer can never perfectly recover.

Occasionally, when the lamb that was selected as a breeder does not turn out well, it is necessary, in order to fatten him and to make his flesh saleable, to castrate him. There are various ways of performing this operation on the young or fully adult sheep. Some proceed precisely as with the horse. An incision is made into the scrotum—the testicle is forced out, the iron clams are put on the cord, which is then divided between the clam and the testicle, and the cautery is had recourse to in order to sear the part and prevent bleeding. This operation usually succeeds well, but it is not every operator on sheep that has the clams or the firing-iron.

The French, and a few English veterinarians, have recourse to a curious species of tortion called *bistournage*. The lamb being secured, the operator seizes the testicles, and pushes them violently upwards and downwards several times, in order to destroy their adhesion to their coverings. Having effected this, the spermatic cord will be easily felt, and has become considerably elongated. He grasps it between the finger and thumb of his left hand about half an inch from the testicle, and then taking the bottom of the scrotum in his right hand, he turns the testicle, pushing it forcibly upward until he has reversed it, and its inferior extremity is uppermost. He now turns the testicle round five or six times, until there is great difficulty in proceeding with the operation from the tightness and hardness of the cord. Preventing this testicle from descending or untwisting, he seizes the other and elevates and turns it in the same way, and to remove the possibility of their descending or untwisting, he ties a piece of waxed cord round the bottom of the scrotum as tightly as he can.

The circulation in the testicles is thus entirely cut off, and they speedily wither away. The cord is cut about the second or third day, but the testicles have formed new adhesions above, and descend no more. There is little danger attending this operation, and not a great deal of pain; but there is considerable difficulty in the manipulation, and it requires a great deal of practice to be enabled to perform it adroitly.

The third, and the preferable way of operating, is to tie a waxed cord as tightly as possible round the scrotum above, and quite clear of the testicles. The circulation will here also be completely stopped, and usually in two or three days the scrotum and the testicles will drop off. Accidents have occurred, but which are attributable to the operator; he has included a portion of the testicle in the ligature, and thus laid the foundation for very great and fatal inflammation; or he has used too large a cord, and which could not be drawn sufficiently tight; or the knot has slackened, and the ligature has pressed sufficiently to produce excessive inflammation and torture, but not completely to cut off the supply of blood. Care being taken in the application of the cord to the exact part, and the tightening of the ligature, the animal seems scarcely to suffer any pain. Indeed the nerves are evidently deadened by the compression of the cord, and no accident occurs.

DOCKING.

There is much variety of opinion among sheepmasters as to the time when this operation should be performed. Some, like Mr. Parkinson, think that it should be done within a very few days after the birth: the ewes on the first, second, or third day, and the male lambs when they are castrated. The author of the "Complete Grazier" would defer it until the lambs are three or four months old. This must depend on the state of the weather, and the health of the animals. No one would dock his lambs when the

weather is very cold, because the bushy tails of the animals afford a great deal of warmth. On this account, in particularly exposed situations, it is deferred until the warm weather sets thoroughly in, and by some, and particularly with their ewes, not practised at all. The tail certainly affords both protection and warmth to the udder, and likewise defence against the dreadful annoyance of the flies in hot weather: but, on the other hand, it permits the accumulation of a great deal of filth; and if the lamb or the sheep should labour under diarrhœa, and the shepherd should be somewhat negligent, the tail may cling to the haunches, and that so closely as to form an almost insuperable obstruction to the passage of the fæces. It likewise can scarcely be denied that the removal of the tail very much improves the beauty of the animal, by the fullness and width which it seems to impart to the haunches.

The operation is a very simple one. An assistant holds the lamb with its back pressing against his belly, and thus presenting the haunches to the operator, who, with a knife, or a strong pair of scissors or forceps, cuts it off at the second or third joint from the rump. A few ashes are then sprinkled on the wound—common flour would do as well, in order to form a coagulum over the part and stop the bleeding. It is seldom that the bleeding will continue long; but if the lamb should appear to be growing weak in consequence of the loss of blood, a piece of twine tied tightly round the tail, immediately above the dock, will at once arrest the hemorrhage: the twine, however, must be removed twelve hours afterwards, otherwise some sloughing will ensue, and care must likewise be taken that the incision is made precisely in the joint, otherwise the wound will not heal until the portion of bone between the dock and the joint above has sloughed away.

GARGET.

The shepherd, and especially in the early period of suckling, should observe whether any of the ewes are restless and exhibit symptoms of pain when the lambs are sucking, or will not permit them to suck at all. The ewe, like the cow, or oftener than that animal, is subject to inflammation of the udder during the time of suckling, caused either by the hardness or dryness of the soil on which she lies, or, on the other hand, by its too great moisture or filth, or by some tendency to general inflammation, and determined to the udder by the bumps and bruises, sometimes not a little severe, from the head of the lamb.

If there is any refusal on the part of the ewe, or even disinclination to permit the young one to suck, she must be caught and examined. There will generally be found redness, and enlargement and tenderness of one or both of the teats, or sometimes of the whole of the udder, and several small distinct kernels or tumours on different parts of the bag. The udder should be cleared from the wool which surrounds it, and should be well fomented with warm water; a dose of Epsom salts administered, and then, if there are no large and distinct knots or kernels, she should be returned to her lamb, whose sucking and knocking about of the udder will contribute, more than any other means, to the dispersion of the tumour and the regular flow of milk. It may occasionally be necessary to confine her in a pen with her little one, in order that he may have a fair chance to suck.

A day, however, having passed, and she not permitting it to suck, the lamb must be taken away; the fomentation renewed, and an ointment, composed of a drachm of camphor rubbed down with a few drops of spirit of wine, a drachm of mercurial ointment, and an ounce of elder ointment, well incor-

porated together, must be rubbed into the affected part, or the whole of the udder, two or three times every day. She must also be bled, and the physic repeated. If the udder should continue to enlarge, and the heat and tenderness should increase, and the knots or kernels become more numerous and of greater size, and some of them should begin to soften or evidently to contain a fluid, no time must be lost, for this disease is abundantly more rapid in its progress in the sheep than in the cow. A deep incision must be made into that part of the udder where the swellings are ripest, the pus or other matter squeezed out, and the part well fomented again. To this should succeed a weak solution of the chloride of lime, with which the ulcer should be well bathed two or three times in the day. When all fetid smell ceases, and the wound looks healthy, the friar's balsam may be substituted for the chloride of lime.

The progress of disorganization and the process of healing are almost incredibly rapid in these cases, and the lamb may sometimes be returned to the mother in the course of a few days. Both teats may possibly be well, or if but one is perfectly restored to its natural function, there will be sufficient milk for the support of the young one. That season having been got through, it will be prudent—except the ewe is an exceedingly favourite one—to fatten her for the butcher; for there will always be a tendency to the recurrence of the disease, and a very slight cause will excite it. There are particular seasons, especially warm and damp ones, and when there is a superfluity of grass, in which garget is peculiarly frequent and fatal. Without warning, the udder swells universally with hardened knobs, which sometimes bring on great inflammation, and if that is not stopped in the course of twenty-four hours, part, if not the whole, of the udder mortifies, and the mortification rapidly spreads and the sheep dies*.

SPAYING.

A few weeks after this the spaying of the rejected ewe-lambs will succeed, an operation which will materially contribute to their increase of growth and disposition to fatten. It is singular that this practice should be almost confined to Great Britain and to Italy, for there can be no manner of doubt of the advantage of it. Daubenton, however, in his "Instructions to Shepherds," gives a useful account of the manner in which it is best performed.

At the age of six weeks, the ovaries are grown sufficiently large to be easily felt, and that is the time usually selected for the spaying, being immediately after the first formal examination of the flock. The lamb is laid on her right side, near the edge of a table, with her head hanging down by the side of the table; an assistant stretches out the left hind leg of the animal, and holds it in that situation, with his left hand grasping the shank; and in default of a second assistant, he also holds the two fore legs, and the other hind leg with his right hand. The lamb being thus disposed, the operator, tightening the skin of the part, makes an incision of an inch and a half in

* Hogg's Shepherd's Guide, p. 184. This disease is very prevalent on many parts of the continent, and particularly in France. It is there called the spider disease, *mal d'araignée*, from a false notion that it is produced by the bite of a spider. It is particularly fatal there "from causes," according to Hurtrel d'Arboval, "that have never been clearly explained." The principal is general neglect of the animals, and the usually neglected and filthy state of the sheep-houses and folds. See Dict. de Méd. et Chirurg. Vet., by Hurtrel d'Arboval, *Mot*, Mamelles (maladies de); also Instructions sur les Bêtes à Laine, par M. Tessier, p. 249: Gasparin attributes the disease to the negligence of the shepherd, and especially his not adopting some decisive measures in its earliest stage; Manuel d'Art. Vétérinaire, par M. A. de Gasparin.

length, midway between the top of the haunch and the navel, and penetrating through the skin; another incision divides the muscles of the belly and the peritoneum. A careful operator will, perhaps, make three incisions, the first through the skin, the second through the abdominal muscles, and the third through the peritoneum. He then introduces his fore-finger into the abdominal cavity, in search of the left ovary, which is immediately underneath the incision; and, having found it, he draws it gently out. The two broad ligaments, and the womb and the right ovary, protrude at the same time. The operator cuts off the two ovaries, and returns the womb and its dependencies; he then closes the womb by means of two or three stitches through the skin, carefully avoiding the abdominal muscles below; and, last of all, he rubs a little oil on the wound, or he does nothing more but releases his patient.

The lamb very probably will be unwilling, and perhaps will altogether refuse to suck or to graze during the first day, but on the following days he will feed as usual. In ten or twelve days the wound will have perfectly healed, and the threads may be cut and taken away. The only thing to be feared is inflammation of the peritoneum which was divided in the operation; but this rarely occurs, and, on the whole, there is not so much danger in the spaying of the ewe-lamb, as in the castration of the tup.

A practice has been lately introduced on the Continent, and to which the attention that it deserves has not yet been paid in Great Britain;—namely,—the spaying of the cow about a month after she has calved, and when she is yielding almost the greatest quantity of milk. The consequence of this has been, that she has continued to yield the same quantity of milk, year after year, and perhaps would do so as long as she lived. It may deserve consideration, in the districts, at least, in which the rearing of house-lamb is pursued, whether it might not be profitable always to have some spayed ewes, to assist in rearing the lambs earlier and later than at present; or to provide milk for them, if it were necessary, all the year round, and that milk on which the lamb would fatten abundantly faster than when cow's milk is often necessarily substituted, and at the same time not be so liable to disease. In the usual lambing season, such foster-mothers would often be invaluable. When the milk was not needed for the lambs, the farmer would not find it difficult to employ it to considerable advantage in many ways. This is merely thrown out as a hint worthy of some attention. Free martins are not so common among sheep as cattle, or at least their occurrence has not been so often noted. There has, however, always been a prejudice against them; they are said to be smaller than other sheep, and not so easily fattened*.

WEANING.

The time of weaning differs materially, according to the locality of the farms and the quality of the pasture. In a mountainous country, and where the land is poor, the weaning often takes place when the lamb is not more than three months old, for it requires all the intermediate time to get the ewes in good condition by the time of *blossoming*, or to prepare them for the market. In a milder climate, and on better pasture, they need not to be weaned until four months old, and that is about the period usually selected. On the other hand, if the pasture is good, and especially if it is the system or the interest of the farmer to sell his lambs in store condition,

* "There is said to be a peculiarity in their manner of discharging their urine, which frequently dribbles from them down their thighs, so that they have even a more unpleasant smell than the goat."—Lisle's Observations in Husbandry, p. 308.

they frequently are not weaned until they are six months old. It is very easy to imagine of what advantage a few of these spayed wethers, of which mention has just been made, would be to afford a plentiful supply of milk both for the early and the late weaning time. Nothing would so materially contribute to get the lambs into good heart and strength, when they were early taken from their mothers; or to make them, what may be termed "prime for sale," as a plentiful supply of ewe's milk, even although it might be necessary to force it upon them with the horn.

The first thing to be attended to, is to remove the lambs and the ewes as far as possible from each other. There will be plenty of confusion and unhappiness for awhile, and which would be prolonged until it was injurious both to the mother and the offspring if they were able to hear each other's bleating; indeed, it would frequently happen that the ewe could not be confined in her pasture if she heard the continued cries of her young one. Two or three days before they are intended to be parted, the ewes and the lambs should be removed to the pasture which the latter are afterwards to occupy, and then, in the evening of the appointed day, the ewes are to be driven away, probably to the pasture which they had occupied with their lambs, or if they are moved to another it should be a poorer and barer one. It will be advisable, although it is not always practised, to milk them two or three times, in order to relieve their distended udders, and to prevent an attack of inflammation or garget. In a day or two they will be tolerably quiet, or if any one should refuse her food she should be caught and examined, and the state of her udder should be particularly observed.

The management of the lambs will depend on the manner in which the farmer means to dispose of them; but at all events they should be turned on somewhat better pasture than that to which they had been accustomed, in order to compensate for the loss of the mother's milk. Many farmers are very fanciful as to the provision for the weaned lambs. The clover, or the sainfoin, or the after-math, are selected by some; others put their smaller and more weakly lambs to weed the turnip crops; but there can be nothing more desirable than a fresh pasture, not too luxuriant, and yet sufficient to maintain and increase their condition. A great deal of caution is requisite here. The lamb must not be overgorged, lest some acute disease should speedily carry him off; on the other hand, he must not be suffered to decline, for if he does he will rarely recover his condition however good the keep may afterwards be.

THE DISEASES OF LAMBS.

The greater part of these have been already hinted at, as the diseases of the different functions passed under consideration.

One of the most fatal is *Diarrhœa*, arising from cold, or from some fault in the mother's milk, or from the new stimulus of the grass when the lamb first begins to crop it, or from its overpowering stimulus at the time at which we are now arrived—the weaning time—and when it constitutes the only food of the animal. Little can be added to the advice given in p. 489, except that at weaning time the farmer must naturally expect that the bowels will be somewhat disturbed, and he must not be too much alarmed about it. While the animal feeds and plays, and the countenance is cheerful, there is no danger; but when the eyes are heavy, and the step is slow and sluggish, and the wool begins to look unkindly, no time is to be lost. A gentle aperient is first indicated, in order to carry off any offensive matter that may have accumulated in and disturbed the bowels,—half an ounce of Epsom salts, with half a drachm of ginger, will constitute the best

aperient that can be administered. To that must be added the sheep's cordial, and housing and nursing*.

The next disease to be mentioned is one of a mingled character. The milk of the mother is no sooner received into the true stomach—the abomasum—of the lamb, than, by the action of the gastric juice, it undergoes a sudden change; a portion of it is converted into a firm curd, while the other retains its liquid form, but is altered in character and is become *whey*. When either the milk or the stomach of the lamb is not in a healthy state, this change takes place in a more decisive manner; the curd is hardened, and retained, and sometimes accumulates to a strange extent; and the whey, pressed out in greater quantity, finds its way quickly through the bowels, and gives an appearance of purging of a light colour. In the natural and healthy state of the milk and the stomach, this curd afterwards gradually dissolves, and is converted into chyme; but when the one takes on a morbid hardness, and the other may have lost a portion of its energy, the stomach is sometimes literally filled with curd, and all its functions suspended. The animal labours under seeming purging from the quantity of whey discharged, but the actual disease is constipation. It is apt to occur about the time when the lamb begins to graze, and when the function of the stomach is naturally somewhat deranged.

This is too often a fatal disease. Mr. Parkinson hints at a piece of peeled willow, tied round the neck of the lamb, as being as effectual in the cure of the *white skit*—for so this complaint is called—as the green willow was for the green skit. He cannot do harm by this superstitious procedure, except that the patient may be lost by the delay; but the remedy, the use of which he urges, can scarcely fail of being destructive.

This coagulation of the milk is produced by the gastric juice, and the accumulation of the coagulated mass is to be traced to the suddenly increased power of this fluid when a new species of food, and more difficult of digestion, begins to be received. Mr. Parkinson orders some *runnet*—the preserved gastric juice of the calf—to be mixed with more milk, and poured down as rapidly as possible; for being thus introduced into the stomach in an unchanged state, he imagines that it will intermix with the food and produce a regular and healthy digestion. The contrary must, of necessity, take place, for the additional quantity of runnet will still more harden the milk, and the death of the animal will be rendered more certain†.

The existence of this coagulation may be suspected, when a lamb that has been apparently healthy, and the mother yielding a sufficient quantity of good milk, is evidently distressed, begins to heave at the flanks, can scarcely be induced to move, has its belly considerably swelled, and is either quite costive, or there is a discharge of whitish whey-like fæces. The stomach has occasionally been found perfectly filled with this curd, and which has weighed three or four pounds. The only chance of saving the lamb consists in dissolving this coagulum. The runnet of Mr. Parkin-

* Mr. Parkinson, in his valuable work on the management of "Live Stock," has distinguished, or fancied that he has done so, two distinct kinds of purging in lambs, and proceeding from altogether different causes. The first is that just referred to in the text, and which he describes as "*the green skit*," and generally occasioned by a change of food, from poor nutriment to that of a rich juicy nature. His method of cure is most inefficient and absurd, and that farmer would deserve to suffer who could be so lost to all common sense as to have recourse to it. "Take a green willow twig, one of the last shoots, and, having twisted it, put it round the neck of the sheep, and it will immediately stop the skit. Simple as this may appear, it is an effectual remedy." Vol. i. p. 410.

† Parkinson, vol. i. p. 411.

son would harden it still more. Chemistry teaches that, while a free acid produces coagulation of the milk, an alkali will dissolve that coagulum. Magnesia, therefore, should be administered, suspended in thin gruel, or ammonia largely diluted with water, and with these should be combined Epsom salts to hurry the dissolved mass along, and ginger to excite the stomach to more powerful contraction. Read's stomach-pump will be found a most valuable auxiliary here. A perseverance in the use of these means will sometimes be attended with success, and the little patient being somewhat relieved, the lamb and the mother should be moved to somewhat baser pasture.

Costiveness.—This, as connected with the accumulation of coagulated milk in the stomach, has been already considered in page 471. It occasionally exists independently of this, both when the lamb is with its mother, and after the weaning. It is generally connected with a bare and dry state of the pasture. The existence of it having been clearly ascertained—there not being, on the one hand, any mechanical obstruction from the wool of the tail being glued over the fundament; nor, on the other hand, any evacuation of small drops of liquid fæces, accompanied by violent straining; the case must be immediately attended to, for it will generally be connected with a degree of fever that may be exceedingly dangerous. Half ounce doses of the Epsom salts, in solution, should be administered every six hours until the bowels are well evacuated; after which the lamb and the mother should be turned into more succulent pasture.

Fever, and Inflammatory Fever.—It has already been stated in page 478, that the lamb is very subject to fever, rapidly degenerating into inflammatory fever. It is sudden in its attack, and usually confined to the best conditioned and most thriving lambs in the flock. If taken in time, the loss of a little blood, or the administration of a tolerable dose of Epsom salts, will generally arrest the malady in its commencement.

In some cases, and when the lamb has been hurried on too fastly for the early market, the stage of simple fever will scarcely be recognised, but the animal will be taken all at once with what is termed "*staggers.*" It is precisely the same inflammatory fever which is recognised by the term "*blood*" in cattle. An hour before, the animal seemed to have been in perfect health; then, almost without warning, he becomes evidently ill; the head is protruded, and the walk is staggering, or the lamb stands still, unable to walk at all; and then he falls, and struggles a little while, and dies. The whole flock being exposed to the same exciting cause, and the mysterious, and powerful, although unsuspected, influence of sympathy being at work, it seems to run through the flock like wild-fire, and a dozen of them have been lost, in less than as many hours. The lancet, physic, and comparative starvation, will afford the only means of cure or prevention.

SORTING OF THE LAMBS.

Soon after the weaning time, and before the operation of spaying commences, the ewes and the lambs of the whole flock should be carefully examined, in order to draft out of it those that are past service, and the younger ones that do not promise to be any acquisition to the flock. In a *breeding stock* this is absolutely necessary, but in a *flying stock*, or that in which the ewes and the lambs are usually sold before the termination of the year, this may be dispensed with; for if a flock is kept merely for the sake of obtaining an annual profit on the purchase, it is of little consequence whether the sheep are or are not well bred, provided they rear their lambs and get into marketable condition afterwards.

It is altogether a different thing with the breeder of sheep. His object is to maintain the purity and acknowledged excellence of his flock, and therefore it is necessary for him every year *to draft*, that is, to set aside for immediate fattening and sale, a greater or less number, and often a considerable number of his young and old stock.

It can scarcely be supposed that there will be any flock in which a great number will not degenerate from the standard of excellence which the breeder had established in his own mind.

The lambs are now particularly under consideration. The sheepmaster is, or ought to be, enabled from long practice to form a sufficiently accurate opinion of the future make and properties and value of the lambs; and a little after the weaning is the most convenient and proper time for this examination.

The first object of the owner of the flock is to select a sufficient number of ewe-lambs to fill up the deficiencies caused by the death of some of his ewes, and the barrenness of others. The principle by which he will be guided is a very simple one. By careful management his flock has assumed a certain character. It possesses certain points in which, in his opinion, the value of the breed mainly consists. Then he will immediately draft or condemn every ewe-lamb that is manifestly deficient in these points, and which are sometimes not a little arbitrary. Some breeders (but their number is decreasing) may look to considerable largeness of bone, and, consequently, of carcass; they may connect this with the supposed advantage, but often real inconvenience, of large joints. Others regard the early disposition to fatten—others, again, the tendency to produce twins—and a fourth party may chiefly look to the quality and the quantity of the wool. They are all good points, and the soil, or the market, or various other circumstances, must determine which should be the primary object of pursuit. The lamb that is manifestly deficient in these points should immediately be drafted.

Although the breeder may have his attention mostly directed to one of these points, yet the lamb that promises to excel in all, or not to be manifestly deficient in either, will be promptly selected; and as the soil and the climate will favour one of these characters more than the others, he will incline to the sheep that seems to possess that character.

The possession of these points, however, will not obtain the ewe-lamb a certain exemption from the draft; for the sheep-owner will still further examine whether this good quality is counterbalanced or neutralized by any glaring defects regarding some other of these qualities, or by any defects at all; and one glaring defect should condemn her, although she may be faultless in every other respect. The defects, as well as the excellencies of the parent, are transmitted to the offspring.

The different districts of the country contain a sheep of a certain and decided character. That character may be improved, but can never, with advantage, be essentially changed. It may be connected with one or two, or with all of the principal excellencies of the sheep. Then comes the consideration,—is there any point about the animal under consideration, that is directly opposed to the characteristic excellence of that district? If so, whatever other good points the animal may possess, it has no right to belong to that flock. The general health, appetite, and growth should be taken into consideration, and perhaps peculiarities of colour will not be quite overlooked.

"It is safe practice to draft as largely as the good qualities of those that are to be transferred to the ewe stock will warrant. The ewes are drafted immediately after the milk has passed away in the weaning of the

lamb. The sooner they are drafted after that the better, as the sooner the draft ewes are put on good pasturage, which they should always be, the sooner they will be ready for the butcher. Those ewes that have missed lamb, having been drafted from the ewes in the lambing in April, and having enjoyed a good pasture all the summer, should be mixed again with the draft ewes, and sold along with them*."

The lamb, even of this age, should have that peculiar yielding feeling of the skin and the texture beneath, which characterizes, almost beyond the possibility of mistake, the profitable breed; and a tolerably correct notion may already be formed of the quantity and the quality of the wool. It will be principally on account of the ewes that this first examination is instituted, but the ram and wether-lambs should not be overlooked, and their future destiny will at least be guessed at, if not finally determined. "Efficient drafting is of the utmost importance in the ewe flock, for on that depends the future character of the whole sheep stock."

Chapter XVI.

THE LOCOMOTIVE ORGANS.

It needs but a slight inspection of the skeleton of the sheep (see p. 109) to be convinced, that the bones, compared with those of cattle, are comparatively slender and light. It is an animal never destined for labour, and rarely thus employed even in the earliest periods of its history, either existing in a wild state, or its journeying confined to a short peregrination to and from the fold, or to a periodical but slow travelling from one pasture to another. It therefore wanted comparatively little substance and strength of bone in order to give attachment to the muscles.

A very great alteration has taken place within the last half century in the size and weight of the bones. The old midland long-woolled sheep were long-legged, and coarse-boned to a very injurious extent. The sheep of the western downs were heavy-boned compared with their successors, if not their descendants, on the south downs. In all of them the leg has been shortened and diminished in bulk, while the chest has been comparatively more developed, yet has not proportionably increased in weight. On the whole, and particularly in the more valuable parts, the bone has diminished, and the muscle and fat have increased in proportionate weight.

Every improvement, however, pushed too far becomes a defect, and the cases are somewhat numerous in which the smallness of the bone has been carried to such an extent as to produce a very objectionable delicacy and tenderness of constitution. There might have been formerly, and there certainly was, too great a quantity of bone in proportion to the meat; but, on the other hand, it has been incontrovertibly proved that a strong constitution is not compatible with a very small proportion of bone.

The comparative weight of bone and of flesh in sheep of the old and of the new breed, being supposed, for the sake of comparison, to be nearly the same, the main improvement that has taken place is the removal of the flesh from the comparatively worthless parts, and its accumulation on those which are more valuable: thus in the scrag of the neck, the proportion of

* Quarterly Journ. of Agric., vol. iii., p. 109.

bone to that of meat in a Leicester sheep is probably 6 oz. in the pound, or nearly a third: in a sheep of a coarser breed, the proportion of bone would be scarcely 3 oz. in the pound, or not one-fifth: but then, on the other hand, the proportion of bone in the leg, in the manner in which it is usually cut by the butcher, would not be more than 1 oz. in the pound in the new breed, and from 1½ to 2 oz. in the other.

The bones of the sheep are less compact than those of the horse, or other cattle. Thence occurs, in the first place, the liability to fracture. From accident, or from the brutality of the drover, a broken-legged sheep is much oftener found in a travelling flock than a broken-legged ox. Notwithstanding the exertion of the greatest care in travelling in a crowded road or street, fractures of various kinds will often occur; yet, if the farmer will recollect his own thoughtlessness and cruelty when he was a boy, or has observed the frequent brutality of the drover, he will be convinced that very few of these mishaps can be fairly charged to accident.

FRACTURES.

The very brittleness of the texture of the bones of the sheep, and the abundance of the spongy substance that enters into their composition, will ensure and quicken the formation of the callus, which is the first step towards the reunion of the bone. If it is the leg that is broken, the divided edges of the bone should be brought as nearly as possible into apposition, and confined by a few splints, and in the course of a very few days new bone will have been secreted, and the fracture repaired. In some cases, however, and more than in any other animal except the dog, when the splints are taken off, there will be an imperfect union by means of the callus, and a false joint will be left. If, when this is discovered, the half-united part is a little rudely rubbed and handled, and the splints again put on, complete bone will usually be secreted.

The author of this treatise has more than once succeeded in reducing a fracture of the thigh in a valuable ewe, but the fractures were rather low down, and he was compelled to sling the patient, which was very easily accomplished. A common napkin with a cord at each corner of it was sufficient for the purpose. The cure was effected in less than three weeks in both cases. This is mentioned in order to prevent the shepherd or the farmer from too hastily dooming the sufferer to the knife if there is anything in its breed which renders it desirable to preserve the animal*.

Fracture of the shoulder is not of frequent occurrence, but will usually be successfully treated if the wool is completely removed, and, as is customary with the dog, a pitch plaster is placed over the whole of the bone. A sheep should not be condemned for fracture of the arm or of the fore-arm; it will, however, be a different matter if the animal was previously destined to the butcher, or travelling to the market in good condition. In such case it may be destroyed, and that should be done immediately lest the flesh become discoloured.

SWELLING OF THE JOINTS.

Lambs from two to five weeks old are very subject to them. The knee

* Ellis says, that "a very poor sheep of his neighbour's was put into a clover field with horses, and had its thigh broken so high that there was no setting it. However, it was continued in the clover till it got very fat, so that when killed the flair of it weighed 10 lbs. The thigh knit and did so well of itself that the sheep went perfectly well on it, only that quarter on the side of the fracture was less than the rest."—Ellis on Sheep, p. 276.

is the most frequent seat of disease; sometimes the fetlock is involved, and occasionally the hock. The joints become very much swelled, and stiff, and hot, and painful. A general stiffness often precedes the local attack. The animal crawls about on its knees, or is unable to raise himself sufficiently even for that purpose; presently he lies down, rarely struggling much, but wastes away, and, in the majority of instances, the case terminates either in death or incurable lameness and worthlessness. The principal cause is a low damp situation, and the dampness aggravated by a cold and wet season. The best remedy is warmth. The lambs must be taken under shelter; their little limbs must be well embrocated with some stimulating embrocation, the bowels kept tolerably open, and some cordial medicine occasionally administered in warm gruel.

In bad cases, and especially when the knee is the part attacked, the inflammation proceeds to dropsy of the joint, or the discharge of purulent fluid, or general enlargement of the limb, and, eventually, stiff-joints. Sir Geo. Steuart Mackenzie describes this under the name of "Leg Evil" or "Black Leg," as "a very formidable disease. It begins at the hoof or knee, which swells and makes the sheep quite lame. The limb is usually covered with small blisters filled with a blueish fluid, and the skin is of the same colour and soon breaks out in sores. This complaint being infectious, care must be taken to remove every animal affected by it from the flock. The diseased limb should be well washed and cleansed in soapy water, and the sores dressed with some caustic ointment*."

RHEUMATISM.

There are a thousand proofs of the existence of this complaint in sheep, from the careless and cruel exposure of the young and old to cold and wet. It is particularly prevalent in low marshy countries in exposed situations. It principally attacks old sheep and very young ones. It sometimes appears as an inflammatory complaint, and considerable fever accompanies it; at other times it has all the characters of a chronic disease, the walk of the sheep or lambs being stiff and cautious, marking the rheumatic patient. Having once seriously attacked the animal, the malady will seldom be completely eradicated; it will therefore be politic to prepare the animal for the butcher as soon as circumstances will permit.

SPRAINS.

The sheep is never made a beast of burden in any of the European countries, nor is it scarcely ever urged to the top of its speed, therefore sprains are of rare occurrence. They do, however, occasionally happen from violent dogging, or from leaping, either to escape their pursuers, or in their frequent attempts to break the bounds which their owner has assigned. Lameness from this cause is seldom the object of medical treatment, yet a good sheep has sometimes been ruined by it. Inflammation has spread over the whole of the joint, and bony enlargement and utter loss of motion have extended to the fetlock and pastern joints.

DISEASES OF THE FOOT.

The dreadful and too frequent disease termed foot-root belongs to the present chapter. There are two varieties of it, or rather there is disease of the foot, properly speaking, and of the fetlock and pastern-joints †.

* Mackenzie on Sheep, p. 49.

† These diseases of the pasterns and feet of sheep have either very much altered their character, or are far more prevalent than they used to be, for the old writers on hus-

DISEASE OF THE PASTERN, OR BIFLEX CANAL, AND FETLOCK-JOINTS.

The fetlock of the sheep, like that of the ox, is a very complicated joint. There are two pastern-bones in each leg articulating with the canon or shank-bone. The leg-bone itself is double in the fœtus, but the cartilaginous substance between the two portions of it is afterwards absorbed, and they become one large bone. The lower bones, however, continue separate, and each division has its own ligaments and tendons, and is covered

bandry make scarcely any mention of them. They are first alluded to in "La Maison Rustique," published by MM. Etienne and Liebault, two French physicians, in 1529:—"If a sheep," say they, "becomes lame through tenderness of his claws, too much softened by having stood over long upon his own dung, and that in such sort as that he cannot go, you must cut off the tip of his so-decayed claw, and put thereupon quick lime, tying it on with some linen cloth, and this to be continued only for the space of a day, and then on the day following to apply unto it some verdigrease, and thus to use these two things in like courses so long as until the hoof be whole and sound." After that no mention of it occurs among the French agricultural writers, and although doubtless under the form of galled feet it always existed to a greater or less extent, yet as a distinct, and severe, and contagious disease, it does not seem to be taken into consideration until after the introduction of the merinos into France. Chabert wrote on it, 1791, under the title of *Crapaud*, and described it, as then prevailing, as an epizootic on the banks of the Gironde, and in the Pyrenees; Tessier observed it in the environs of Paris, and Husard in Piedmont; but it was not until the year 1805 that Pitet attracted general attention to it, by a very laboured essay on its nature and treatment.

Lullin, in his account of the Swiss sheep, speaks of it as not having been known in Geneva until about the year 1786, when it was brought from Piedmont. In the account, by authority, of the management of the Flemish sheep in 1763, there is no mention of the foot-rot.

Among our own writers, Sir Anthony Fitzherbert, or Fitzherbarde, in 1523, speaks of the disease of the biflex canal, and adopts the superstition or error respecting it, which is not altogether discarded at the present day, that the lameness proceeds from a worm in the sheep's foot. "There be some shepe that hath a worme in his foote that maketh hym halte. Take that shepe and loke betwene his clese, and there is a lyttell hole, as moche as a grette pynnes heed, and therin groweth fyve or yxe black heares, like an inche long and more. Take a sharpe poynted knyfe, and slitte the skynne a quarter of an inche longe above the hole and as moche bonethe, and put thy one hande in the hollowe of the fote under the hynder clese, and set thy thombe above almooste at the slytte, and thruste thy fyngers vndernethe forward, and with thy other hande take the blacke heares by the ende, or with thy knyves poynte, and pull the heares a lyttel and a lyttel, and thruste after thy other hande, with thy finger and thy thombe, and theyr wyll come out a worme lyke a piece of fleshe, nygh as moche as a lyttel fiynger, and when it is out put a lyttel towe into the hole, and it wyll be shortely hole."—Boke of Husbandry, p. 40.

Gervase Markham, in his 'Maister-Piece,' first published in 1613, says, "that a certain cure for sheep's feet that are galled is, if you beat a pomegranate, not ripe, with alum, and adding to it a little vinegar, apply it to the place; or the powder of galls burnt, mixed with red wine, and so laid into it, is very good."

Adam Speed, who wrote in 1628, gives a receipt to cure lame and hurt claws. He says, "for claws that are lame, bruised, overgrown, or broken, pare them as much as is convenient; then make a plaister of bees' wax, rosin, turpentine, unslacked lime, and hog's grease, anoint the claw with oil of camomile, and lay the plaister on it, binding it up hard, and suffer him not to go into wet places till he is well."

In 1703, James Lambert gives a similar receipt for broken claws. Mr. Lisle, who farmed his patrimonial land at Crux Easton, in Hampshire, was the first to speak of the foot-rot, as it exists at the present day. "The sheep," says he, "near Loughborough,"—it would seem that the disease had not then reached Hampshire—"are mightily troubled with the *foote* or soreness of the claws, and so are the cows; sometimes a hundred sheep in a flock shall be down together, and so troubled with it, that they will be forced to feed on their knees; and many, for want of good management, never recover it, but continue always lame. Verdigrease and hog's lard is a good medicine for it, and some use aqua fortis for it.

"This distemper breaks out between the claws of a beast or sheep with rottenness or stink. Before you dress the sore, you must pare the claw, so far as it is hollow, then put so much of the liquor—composed of alum and arsenic, boiled in vinegar and water—as will run all over the sore. The foot must be dry when it is dressed, and kept so for an

by its own integument. The whole of the fetlock-joint is weakened by this division, and each of the pasterns below is also materially weakened.

At the portion of the skin immediately over the point of bifurcation of the pasterns, there is found in the sheep and in the goat a small orifice called the biflex canal, because it is common to both of the pasterns. It is formed by a fold of the skin, and immediately within the skin it bifurcates, and a canal or tube runs down on each side over the inner face of the pastern, reaching to the coronary ligament at the commencement of the hoof. It contains a great number of follicular sebaceous glands, which secrete a yellow strong-smelling mucous fluid. At the bottom, this canal curves upon itself and terminates in a blind pouch or cul de sac. The superior orifice, always open, is marked by a little tuft of hairs growing from it, and often agglutinated together by the perspiration of the part, or by the adhesive discharge from the canal. The function or use of this singular pouch has never been satisfactorily explained. It may answer two purposes—it may contribute to the suppleness, or freedom of motion of the pasterns, and enable them to adapt themselves to the irregularities of the ground and share the weight of the animal equally between them, or it may secrete a bland and evaporating fluid, which will be in contact with the pastern and joints of the foot in cases of sprain and injury.

Whatever may be the function of the canal it is sometimes the seat of considerable disease, which has been confounded with foot-rot, and which 'in common parlance' is here described as a variety of it.

An accumulation of this sebaceous fluid in the biflex, interdigital canal, or the introduction of foreign bodies into it, such as dust, dirt, or gravel, may cause a considerable degree of local inflammation, and which may be communicated to the neighbouring parts. Diseases of this canal are of most frequent occurrence when the flock is turned on hard, dry, or sandy pastures. Heavy and fat animals are, as might naturally be supposed, most subject to its attacks; sometimes in every season of the year, but oftenest when the weather is hot and dry. The great number of sheep that have been attacked by it at the same time, and especially as it has been so generally confounded with foot-rot, have excited the suspicion that it is infectious. There does not, however, appear to be any ground for this supposition.

The inflammation is first discovered by the lameness of the sheep, which probably leads to an examination of him, when the part is found to be hot and tender, with some enlargement. If the animal is neglected, the swelling will, probably in a few days, reach the pastern and the coronet below, and the fetlock and the leg-bone above, and to this will follow ulceration of some part of the biflex canal, which will speedily become a source of great annoyance and mischief. The pus penetrating inferiorly will find its way under the coronet, and produce quittor, or even loss of the hoof on the affected side; sometimes ulcers will appear about the fetlock.

Generally speaking, the disease attacks only one foot, and then the

hour; and in ordinary cases, in once or twice dressing you need not doubt of a cure."—Lisle's Observations on Husbandry, p. 342.

In the time of Ellis, who wrote in 1749, the disease was perfectly naturalized in Great Britain, and especially in the counties round the metropolis. He speaks of the ewes being seized with the foot-rot, that it is communicated to other sound ewes, and to the lambs which they suckle, and that most of the meadows are so much infected with this sheep malady, that few of the suckling ewes are ever clear from it in a greater or less degree; the pain and anguish thereof keeps them poor in flesh, and lessens their milk; so that two or three ewes thus afflicted, give no more milk than one full-milched ewe that is in perfect health.—'Ellis's Shepherd's Sure Guide,' p. 230.

sheep goes about on three legs. If both fore-legs fail, he must be content to crawl about on his knees. The biflex canal is found in all four feet, but it is comparatively seldom that the hind feet are diseased. The poor animals evidently suffer a great deal, for they scarcely feed—rumination is suspended—fever is established, and, in some bad cases, the sheep pines away and dies.

Before the disease has gone so far as this, the proprietor, acting humanely and wisely, should send the animal to the butcher. The note at p. 524 has already explained the once common opinion respecting this complaint—namely, that it was caused by a worm that had eaten its way into the leg, the hole through which it had entered being still visible. According to this doctrine the only means of cure lie in the removal or destruction of the worm.

The treatment in the early stage of the disease consists in the extraction of any foreign bodies that may have insinuated themselves into this canal, and in fomenting the part and the whole of the foot. These lotions should be followed by a poultice enveloping the whole foot and the greater part of the leg—an emollient poultice at first, and until the discharge of purulent, and perhaps fetid, matter is staid, and then an astringent one. A decoction of oak bark will form a good liquid for the poultice. In very bad cases, local bleedings (scarifications) round the coronet are practised with considerable advantage. Any tendency to gangrene is combated by a solution of the chloride of lime.

A cure, however, will not often be accomplished by these means, except when there is no actual disorganization of the biflex canal. If that should have taken place it will be necessary to lay it open or remove it, and when it is dissected out, thickened by inflammation and with its singular natural tortuous form, the older shepherds will readily be forgiven for endowing it with life and the power of producing almost irreparable mischief. The French strongly recommend the removal of this singular reservoir, but that will not always be necessary. The orifice into the canal may be somewhat enlarged, and a probe-pointed bistoury thrust into that division of it which is most or alone affected, or a small seton needle may be introduced, and brought out just above the coronet. Either of these operations, and especially the latter, will usually succeed. The wound, if the bistoury has been used extensively, should be daily dressed with digestive ointment for a while, and which should be afterwards changed for the tincture of myrrh; the old butyr of antimony not being forgotten if the case seems to require it*.

FOOT-ROT.

Foot-rot is a disease always at first, and usually throughout its whole course, confined to the foot. The first indication of foot-rot is a certain degree of lameness in the animal. If he is caught and examined, the foot will be found hot and tender, the horn softer than usual, and there will be enlargement about the coronet, and a slight separation of the hoof from it, with portions of the horn worn away, and ulcers formed below, and a discharge of thin fetid matter. The ulcers, if neglected, continue to increase; they throw out fungous granulations, they separate the hoof more and more from the parts beneath, until at length it drops off.

All this is the consequence of soft and marshy pasture. The mountain or the down sheep—the sheep in whose walk there is no poachy ground, if

* See Traité du Pied, par J. Girard, pp. 319 and 342, and Dict. de Méd. Vét., par Hurtrel d'Arboval, tom. ii., p. 109.

he is not actually exposed to infection by means of the virus, knows nothing at all about it; it is in the yielding soil of the low country that all the mischief is done.

In attempting to explain this, the author cannot do better than to have recourse to much of the beautifully graphic description of the healthy foot of the sheep and the changes which it undergoes, as given by his talented and excellent friend, Professor Dick, of Edinburgh.

The foot presents a structure and arrangement of parts well adapted to the natural habits of the animal. It is divided into two digits or toes, which are shod with a hoof composed of different parts, similar in many respects to the hoof of the horse. Each hoof is principally composed of the crust, or wall, and the sole. The crust, extending along the outside of the foot, round the toe, and turning inwards, is continued about half-way back between each toe on the inside. The sole fills the space on the inferior surface of the hoof between these parts of the crust, and being continued backwards becomes softer as it proceeds, assuming somewhat the structure of the substance of the frog in the foot of the horse, and performing, at the same time, analogous functions. The whole hoof, too, is secreted from the vascular tissue underneath.

Now this diversity of structure is for particular purposes. The crust, like that in the hoof of the horse, being harder and tougher than the sole, keeps up a sharp edge on the outer margin, and is mainly intended to resist the wear-and-tear to which the foot of the animal is exposed. The soft pasturage on which the sheep is occasionally put presents little, if any, of that rough friction to which the feet of the animal is naturally intended to be exposed. The crust, therefore, grows unrestrained until it either laps over the sole, like the loose sole of an old shoe, and serves to retain and accumulate earth and filth, or is broken off in detached parts; in some cases exposing the quick, or opening new pores, into which particles of earth or sand force their way until, reaching the quick, an inflammation is set up, which, in its progress, alters or destroys the whole foot.

The finest and richest old pastures and lawns are particularly liable to give this disease, and so are soft, marshy, and luxuriant meadows. It exists to a greater or less extent in every situation that has a tendency to increase the growth of the hoofs without wearing them away.

Sheep that are brought from an upland range of pasturage are more particularly subject to it. This is very easily accounted for. By means of the exercise which the animal was compelled to take on account of the scantier production of the upland pasture, and also in consequence of the greater hardness of the ground, the hoof was worn down as fast as it grew; but on its new and moist habitation the hoofs not only continued to grow, but the rapidity of that growth was much increased, while the salutary friction which kept the extension of the foot within bounds was altogether removed. When the nails of the fingers or toes of the human being exceed their proper length they give him so much uneasiness as to induce him to pare them, or if he neglects this operation they break. He can pare them after they have broken, and the inconvenience soon ceases, and the wound heals. When, however, the hoof of the sheep exceeds its natural length and thickness, that animal has no power to pare them down, but there long continues a wound, irritated, and induced to spread, by the exposure of its surface, and the introduction of foreign and annoying matters into it.

The different parts of the hoof, likewise, deprived of their natural wear, grow out of their proper proportions. The crust, especially, grows too long; and the overgrown parts either break off in irregular rents, or by

overshooting the sole allow small particles of sand and dirt to enter into the pores of the hoof. These particles soon reach the quick, and set up the inflammation already described, and followed by all its destructive effects.

There is another circumstance which tends to produce disease in an overgrown hoof. The length to which the crust grows, changes completely the proper bearing of the foot, for, being extended forward, it takes the whole weight of the superincumbent parts. By the continual pressure on this lengthened part inflammation cannot fail of being set up. The progress of the disease is not equally rapid in every instance; sometimes it goes to a certain extent, and the foot to a considerable degree recovers. All the feet may not be equally affected; the fore ones, however, are always the most liable to disease, on account of the additional weight which they carry. Sometimes there is only one foot affected, and that is sure to be a fore one—sometimes only one hoof of one foot, and occasionally one speedily heals while the other continues to get worse and worse.

In the first stage of the disease there is often found nothing but a little overshooting of the edge of the crust, and which is bent in upon the sole, or the edge of the crust is forced asunder from the sole and a wedge of earth is introduced which presses upon the sensible substance beneath; but at other times the edge of the crust continues to grow until it envelopes the whole of the sole. It is seldom that there is inflammation enough excited to throw off the whole hoof at once; but it separates at different parts, and at each part of separation there is new horn formed; this although soft and unhealthy, and not capable of sustaining pressure, covers, and, to a certain degree, protects the sensible parts beneath. By degrees, from increased and long-continued irritation, the parts are no longer able to secrete even this weak horn, but granulations of proud flesh sprout out, and then the work of destruction proceeds in good earnest.

This is the usual progress of the disease, but at other times inflammation seems to be set up at once over the whole of that division of the foot, and there is considerable swelling about the coronet, and matter is formed and breaks out, and sinuses run in various directions, and the whole of the hoof is gradually detached. The upper part of the space between the hoofs becomes inflamed and swelled, the whole of the inner surface of the pasterns is sore and raw; ulceration commences—it eats deeply—it spreads on every side—it spreads upwards—and the toes are separated from each other almost to the opening of the biflex canal. That canal becomes inflamed—proper inflammation of it is added to that of the sensible parts beneath the hoof—the mucous follicles which it contains, and of which mention has been made, pour out a large quantity of sebaceous discharge, which flows over the fore part of the foot and between the hoofs, and assists in the accumulation of filth by its adhesiveness. In some cases, as has appeared when the diseased state of this canal was examined, the malady commences here. Inflammation of the biflex canal produces much enlargement of the neighbouring parts, and the motions of the foot are interfered with, and inflammation and disorganization spread on every side. As these increase, and also the discharge by which they are accompanied, dirt and gravel, and pieces of grass adhere to the ulcerated surface, and insinuate themselves between the pasterns, there soon becomes one uniform mass of disease.

The ulceration of foot-rot will not long exist without the additional annoyance of the fly. Maggots will multiply on every part of the surface and burrow in all directions. To this, as may be readily supposed, will be

added a great deal of constitutional disturbance. A degree of inflammatory fever is produced. The animal for a while shifts about upon its knees, attended by some faithful companion that abandons it not in its utmost need; but at length the powers of nature fail, and it dies from irritation and want.

This is a dreadful account, and yet, after all, the disease is more manageable than could well be imagined, if it is attacked in its earliest stage and treated with proper decision. It will seldom be necessary, or, indeed, proper to adopt any means for the purpose of abating inflammation before the radical mode of cure is adopted. Poultices and emollients will only weaken the parts, and cause the fungous granulations to increase with tenfold rapidity.

The foot must be carefully examined, and every portion of loose and detached horn pared off, even though the greater part, or almost the whole of the hoof may be taken away. The horn once separated from the parts beneath will never again unite with them, but become a foreign body, and a source of pain, inflammation, and fungous sproutings. This, then, is the first and fundamental thing—*every portion of horn that is in the slightest degree separated from the parts beneath must be cut away.* A small, sharp, curved-pointed knife, or a small drawing knife, will be the best instrument to effect this.

If there are any fungous granulations they must be cut down with the knife or a pair of sharp curved scissors, unless they are exceedingly minute, and then the caustic about to be mentioned will destroy them. The whole foot must be thoroughly cleaned, although it may occupy no little time, and inflict considerable pain on the animal. The after expenditure of time, and the suffering of the patient, will be materially diminished by this decisive measure.

The foot should then be washed with a solution of chloride of lime, in the proportion of one pound of the powder to a gallon of water. This will remove the fœtor, and tendency to sloughing and mortification, which are the too frequent attendants on foot-rot. The muriate or butyr of antimony must then be resorted to, and by means of a small stick with a little tow tied round one of its extremities, applied to every denuded part: lightly where the surface has a healthy appearance, and more severely where fungous granulations have been cut off, or there are small granulations springing up. There is no application comparable to this. It is effectual as a superficial caustic; and it so readily combines with the fluids belonging to the part to which it is applied, that it quickly becomes diluted, and comparatively powerless, and is incapable of producing any deep or corroding mischief. So far as these foot cases are concerned, it supersedes every other application. The change of colour in the part will accurately show to what portions it has been applied, and what effect has been produced.

If the foot has been in a manner stripped of its horn, and, especially, if a considerable portion of the sole has been removed, it may be expedient to wrap a little clean tow round the foot, and to bind it tightly down with tape, the sheep being removed to a straw-yard, or some enclosed place, or to a drier pasture. This last provision is absolutely necessary when the sheep is again turned out; for if the foot is exposed to the original cause of disease, the evil will return under an aggravated form.

The foot should be dressed every day; each new separation of horn removed; and every portion of fungous submitted to the action of the caustic, with a degree of severity proportioned to the necessity of the case. The new horn should likewise be examined. If it appears to be healthy and tolerably firm, nothing should be done to it; but if it is soft and

spongy, the caustic must be lightly applied. The sooner the bandage can be removed, and the sheep turned into some upland or thoroughly dry pasture, the better will it be for the foot, and the health of the animal generally.

The worst cases of foot-rot will readily yield to this mode of treatment, provided the bone has not been exposed, and there are no sinuses running either into the joints or deep-seated parts of the foot, or of the pasterns above. All superficial mischief will be readily repaired, and more speedily than could have been thought possible; but there is always a considerable degree of uncertainty when, the horn being removed, the ulcerations are found to be deep, and certain sinuses or openings betray the existence of greater mischief within the foot. The case will, at all events, occupy a considerable time, and give no little degree of trouble; and it will be for the owner to consider whether he had not better destroy the sheep if he is in tolerable condition, than to run the risk of his pining away, and ultimately sinking under long-continued and increasing suffering.

The sheep that has been attacked by foot-rot should not be suffered to rejoin his companions while there is the slightest discharge from any part of the foot. This goes on the supposition that the foot-rot may not only be produced by the causes that have been mentioned, but that the discharge from the sores and sinuses is of an infectious nature. Some valuable writers, and Professor Dick among the number, have denied the infectiousness of foot-rot. They find sufficient reason for the spreading of this disease through a whole flock, from all the animals having been exposed to the same exciting cause; the feet of all of them having been macerated by the soft and damp pasture on which they have trodden, and the internal part of the foot being thus denuded and injured.

There are many flocks, with regard to which it would be idle to seek for the cause of foot-rot in infection; but the fair question is, have there not been repeated instances in which a diseased sheep has been admitted into a flock that had hitherto been sound, and on pasture that had never given the foot-rot, and in the course of a few weeks or months the complaint has been common among the greater part of them? It is almost superfluous to argue that there are numerous diseases that may be produced by natural causes, and yet are communicable from one animal to another; and on the other hand, that it is difficult or almost impossible to suppose that any infection could be communicated while the hoof remains sound. The question is, are there not cases that can only be accounted for on the supposition of infection?

Professor Dick relates no experiments of his own or that have come under his immediate observation in proof of the non-infectiousness of foot-rot; but he refers to some experiments that had been made in France on this subject, and proving, as he imagines, that foot-rot cannot be communicated from one sheep to another by inoculation. He then enters into a train of argument with regard to the improbability, or impossibility, of its communication while the hoof remains sound. The most satisfactory way will be to relate these experiments at length; their value will then be better estimated. The importance of the subject; the decision of a question in which the interest of the sheep-farmer is so much involved—namely, whether foot-rot is or is not infectious, will be a sufficient apology for any length of detail.

Professor Gohier of the Veterinary School at Lyons was the experimenter. Several cases of foot-rot had come under his notice. He first relates them, and the impression which they made on his mind, and the course which they led him to pursue.

In October, 1807, M. Boucher bought two sheep at a fair. Three days after they had reached his farm they became lame. The disease, which he immediately recognised as foot-rot, became worse and worse; and, a few days afterwards, he saw some of his own sheep, which had been previously sound, beginning to grow lame, and the disease became general throughout the flock.

Six sheep, belonging to M. B., mixed in 1808 with some others affected with foot-rot, a short time afterwards they were as bad as the others.

Fifteen sheep, lame with foot-rot, were sent to another flock composed of forty sheep. About a month afterwards two sheep began to be lame. It was soon plain that they had foot-rot. Four months after that it was almost universal in the flock.

A ram, from a flock in which foot-rot prevailed, and having it himself, was put with some ewes belonging to two other gentlemen. These ewes soon began to be evidently affected, and eighteen months passed before the disease was eradicated.

In 1810 he attended several flocks of sheep among whom foot-rot had raged. It was suspected to have been brought by two sheep that had been purchased at a fair.

The observation of these cases suggested to him the idea of inoculating some sound sheep with the matter of foot-rot, and thus putting the real contagiousness of the disease to the test.

Experiment 1.—This was made on October 18th, 1815. He pared the two fore-feet of a sheep to the quick, and applied on the sole some morsels of horn covered with the matter of foot-rot. The part was left undisturbed during eight days. This first operation produced no effect.

Experiment 2.—On the 18th of December the experiment was repeated on the hind feet of the same sheep, with this difference, that there was no removal of the horn, but the skin of the bifurcation of the pasterns of the fore-feet were well rubbed with the foot of a sheep that had the foot-rot badly. No disease supervened.

Experiment 3.—January 11, 1816. After having pared the soles of the fore-feet of the same animal until the blood started a portion of horn from the foot of an infected sheep was bound on it. On the 17th this horn was removed. A small fungous ulcer, of a livid colour, was perceived at the top of the external hoof of the left fore-foot. Two days afterwards it appeared as if it were healing, but the animal went lame as he had done on the 17th. On the 25th the ulcer began to increase, and continued slowly to do so until the 1st of February. The hoof was a little lengthened, the lameness was very great, and the animal was constantly lying down. On the 8th, the ulcer had reached the internal and anterior parts of the hoofs. The horn was removed, and the ulcer was healed; but it soon appeared on the neighbouring parts. The foot-rot, for it could no longer be misunderstood, extended between the two hoofs, and the animal became still lamer. The sheep continued in nearly the same state until the 25th of March, when he began to improve, and on the 24th of April no trace of the disease remained. A month afterwards he was destroyed.

Experiment 4.—On the 24th of March, however, he inoculated the two hind-feet and the right fore-foot of this animal, in the same way as in the two first experiments, but with no effect.

Two experiments, which he had made in 1810, had the same result. The disease was not communicated until the second inoculation. The disease lasted about a month, and then disappeared without treatment.*

* Mémoires et Observations sur la Chirurg. et la Méd. Vét. par J. B. Gohier, tom. ii., p. 153.

These experiments, then, instead of proving the non-contagiousness of foot-rot, clearly establish the fact that it is contagious. The inoculation succeeded, indeed, but twice out of six times, but it did then succeed; it produced a disease which Professor Gohier acknowledges could not be misunderstood. The effect of the inoculation was also precisely that of the same operation in other cases. The disease appeared under a much milder form. It would be quite sufficient to rest the matter here; but the importance of the question demands the fullest inquiry.

Mr. Black, the farm-overseer to the Duke of Buccleugh, is also an anti-contagionist. He had thirteen score of black-faced sheep, the greater part of which were affected with foot-rot, and many of them crawling about on their knees. He turned them into a drier pasture on which were seven score of Leicester and Cheviot sheep. All of the diseased sheep, except four, recovered, and not one of the Leicesters or Cheviots was infected. This is an important fact, and deserves consideration; but it only proves that infection does not always and necessarily follow the mixture of sound and infected sheep. In the experiment of Professor Gohier it was only in two out of six inoculations that the disease was communicated, and in his previous observations no more than a portion of the flock was infected.

The experience of those who believe in the contagiousness of foot-rot must next be glanced at; and those of the continental sheep-masters shall first be inquired into.

"On the 4th of September, 1824, Mr. Vidal, of Abroc, in France, never had had the foot-rot in his flock, which then consisted of forty-six ewes and two rams. He lent one of his rams for the purpose of breeding, and which was put among a flock, the greater part of which were affected by the foot-rot. On the 17th day of October it was returned very lame. Mr. Vidal, knowing nothing about the foot-rot, and paying no attention to the lameness, placed him among his sound flock. On the 11th of December sixteen of them had evidently contracted the disease.

"In April, 1825, his flock was entirely renewed and consisted of fifty-two sheep, not one of which was lame. His sheepfold was clean and airy, the dung often removed, and the litter always fresh. Towards the end of the month he hired another shepherd, whom he cautioned never to suffer his flock to pasture with those of other persons. He neglected the caution, and they mingled with a flock among which the rot was general. On the 11th of May he had no fewer than six sheep affected with the rot.

"In June 26, the same shepherd again disobeyed his master's orders, and fifteen became diseased." *

M. Pictet, in his "Essay on the Foot-rot," (translated in the Philosophical Magazine,) says "that a flock of French sheep, labouring under this disease, was driven into the neighbourhood of a Spanish flock. The straw upon which they had lain was not taken away, and the Spanish flock having afterwards been sent into the pent-house, the foot-rot began to show itself among them in about fifteen days." †

Gasparin, deservedly ranking with the best of the French veterinarians, carries the contagiousness of foot-rot to a still greater extent. He says, "that it occasionally spreads to the pigs, the dogs, and even the poultry." No case has occurred in the practice of the writer of this work that will justify such an assertion.‡ M. Favre, a Genevese veterinarian, instituted a course of experiments which can leave no doubt at all about the question.

* Rec. de Méd. Vét. Juin, 1831.

† Sir George Stuart Mackenzie on Sheep, p. 55.

‡ Manuel d'Art Vétérinaire, par A. De Gasparin, p. 252.

He inoculated thirty-two sound sheep with the matter of foot-rot, and twenty of them became infected. On one of the sheep that would not take the infection he operated six times ineffectually. He tried once more, and foot-rot was produced.*

It will, however, be more satisfactory to the British farmer to consult the experience of our own sheep-masters. "As a proof that the foot-rot is contagious," says Mr. Parkinson, "I will relate a circumstance that happened in my flock when I lived in Doncaster. I had hired a ram from a ram-breeder, and when he came to me I found that he had the foot-rot in one foot very bad. I had always known it supposed by the shepherds to be infectious, and this circumstance proved the fact. I ventured to put him to the ewes. The result was, that they took the infection; nor could I free them from it in the whole of the time I kept them, which was thirteen months."†

Mr. James Hogg, who from his childhood until he became of mature age was a shepherd, says that "it is highly infectious, for it has often been known that the driving of an infected flock over part of another farm has brought it upon the flock of that farm, with the utmost virulence."‡

Mr. W. Hogg confirms the account of the gradual progress of this disease. He states, that "it is little more than twenty years since it began to appear among the mountains of Scotland." He adds, "that the rapidity with which it was propagated, and its destructive consequences, induced the store-masters to regard it with the deepest attention, when they found that it was a very contagious disease." His own opinion of the contagiousness of it is expressed in very strong language—"Wherever it exists it spreads with an unvarying and constant progress, until it has established itself among the whole flock."§ This, if not true to the letter, yet very nearly corresponds with the experience of every sheep-master with whom the author of this work has had the pleasure of communicating.

Mr. Laidlaw, of Bower Hope, than whom there can be no higher authority, states, that "it first began to appear among the Highland breed of sheep about thirty years ago; and that, when a stock is once infected, it becomes extremely difficult to extirpate the malady. That the disease is highly infectious every person at all acquainted with it readily admits."‖

There cannot be a doubt on which side the preponderance of evidence lies, and the question would not have been entered into at so great length were not the settlement of it so essentially connected with the interest of the sheep-breeder. It is produced in certain individuals of the flock, by the process of maceration and softness which the hoof undergoes on the moist surface of certain pastures; but, once set up, an ichorous and venomous fluid is secreted, by which the disease is too surely and rapidly spread. "In all situations where it has obtained a footing," says Mr. W. Hogg, "we find it beginning in a particular place, and, if unopposed, extending wherever there are sheep to be affected by it."

It has been said that the manner in which the contagion is conveyed has not been satisfactorily explained. There is no necessity, however, to have recourse to any epidemic influence, or to any constitutional affection produced by feeding on the grass on which the virus has been deposited. The account that has been given of the state of the foot, its

* Recueil de Méd. Vét., 1825, p. 43.

† Parkinson on Live Stock, vol. i., p. 409.

‡ Quarterly Jour. of Agric., N. S., vol. ii., p. 701.

§ Prize Essays and Transactions of the Highland Society of Scotland, N. S., vol. iii., p. 308.

‖ Prize Essays, &c., vol. iii., p. 314.

degree of maceration, the opening of all its pores, the frequent laceration of the horn, and the absolute exposure of a greater or less portion of the sensitive substance of the foot, the frequent inflammation, and sometimes ulceration of the thin skin which covers the coronet,—all these circumstances afford means more than sufficient for the absorption of the virus and the production of the disease.

Some persons have imagined that foot-rot is propagated by means of animalculæ which are bred in the virus of the part, and, falling on the pasture, attack the feet of other sheep. They have gone so far as to describe this insect, and to give it a name—*the pulex penetrans*. The author of this work has often sought for it in vain; and the sources of contagion are numerous and satisfactory enough, without any gratuitous supposition of this kind.

The establishment of this cause of the disease leads to an evident and an effectual mode of prevention; the removal of every sheep that begins to halt, and before the secretion of the virus has commenced. It is bad policy to let the poor animals crawl about the pasture on their knees, day after day; and the sheep-owner will severely suffer for his folly. How long a pasture may be considered to remain tainted it is impossible to decide; but a heavy rain or sharp frost would probably wash the virus away, or destroy its power. The sheep that are removed should not be permitted to return until their feet are perfectly healed, and have been well washed.

It would be a very important inquiry whether some breeds of sheep are more subject to it than others. It would hardly be supposed that there would be any constitutional predisposition, and yet it is an undeniable fact, that although galled and sore feet had occasionally existed in sheep-flocks from time immemorial, the foot-rot, with all its dreadful accompaniments and consequences, was not known until the modern system of improvement commenced—until the carcase was heavier, and its support lessened in bulk —until the flesh and the fat were increased, and the bone and the horn diminished. Allied to this is another fact, that ewes in lamb are peculiarly subject to foot-rot, on account, probably, of the additional weight which the feet have to support.

The previous habits of the sheep would have a more decided influence in the production of foot-rot. Supposing different lots of sheep were taken from a dry upland pasture, and placed on a moist and richer soil; the consequence would be that the hoofs of all would be macerated and softened, and exposed to injury, but that injury would be proportionate to the pressure upon and the wear of the foot. That was a very interesting account which was given by Mr. Black, p. 532, of the progress of foot-rot among certain sheep of different kinds, that had been turned into one of the parks. The black-faced sheep were first affected, and to the greatest degree; next in degree was a cross between the black-faced and the Cheviot; then the Cheviot, and, last and least of all, the Leicester breed. "I was at a loss," says he, "to account for this peculiar liability in the different breeds, while all were exposed to the same circumstances; but by carefully watching the flock, I found that the black-faced got up from their lairs the earliest in the mornings, and, from their being accustomed to roam from the hill to the glen at the approach of daylight in search of their food, continued from habit to wander through the park before they began to feed. The other breeds possessed this disposition precisely in the order in which the disease appeared. Consonant with this is the common remark, that Southdown sheep, removed from their native downs to low and moist pasture, are peculiarly subject to foot-rot. A most useful conclusion will naturally be drawn hence as to the kind of sheep that should be selected for different soils and pastures.

As the foot-rot proceeds from the distorted form of the hoof, and the irregularity of the pressure, more than from the simple wearing away of the softened horn, it might be useful, and especially on suspected ground, to pare the feet of all the sheep twice in the year—in October or November, and April or May, taking advantage of a wet day or two, when the horn will be more than usually soft. If there should be the slightest appearance of unsoundness at these periodical parings, the proper applications should be made to the feet. The sheep might occasionally be folded on some bare and hard spot, or driven twice or thrice in the week a little way along the road. Prevention would in this, and many other cases, preserve the animal from disease and torture, and the owner from expense and loss.

Chapter XVII.

THE INTEGUMENT.

The skin of the sheep, although composed, like that of other animals, of the cuticle, the subjacent mucous tissue and the true skin, differs materially from that of most of them in some of its functions. It is exceedingly deficient both in the powers of excretion and of absorption; or rather there are circumstances about it which materially limit the action of these functions; and, as it were, confine the office of the integument to the production and the support of the fleece. It is surrounded by a peculiar secretion, adhesive and impenetrable to moisture—the *yolk*—destined chiefly to preserve the wool in a soft, pliable, and healthy state.

Then there can be little cutaneous perspiration going forward from the skin of the sheep, and there are consequently few diseases that are referrible to change in this excretion; and, on the other hand, little or no advantage can be derived from an increase of it, as indicating a salutary direction of the fluids, or relieving other and dangerously-congested parts. There is likewise less expenditure or radiation of animal heat, both on account of the interposition of the yolk, and the non-conducting power of the wool. The caloric disengaged from the sheep is about the seventh part of that of the human being, although the weight of the animal is one-third of that of man; or in other words not more than half of the animal heat radiates from a certain surface on the sheep which there does from man. This is a wise and kind provision of nature, well explaining the means by which the ewe and the lamb are enabled to endure, without apparent detriment, many a hardship, and rendering those without excuse who still suffer them to be lost from the cruel exposure to cold and wet, which bid defiance even to these admirable means of defence.

Sheep are accustomed to crowd as closely together as they can during the night. In many parts of the world they are driven into the sheepfold when evening approaches. These provisions are most advantageous here—an unnatural and dangerous state of heat is not so soon produced, and, the skin being defended from actual contact with that of their fellows, infectious diseases are not so readily communicated. It is only when in the open field the animal can rub himself against the gate or the post, so as to break through this natural protection, and denude the skin, that cutaneous maladies spread through the flock.

If the skin of the sheep is thus deprived of many of the properties and

functions which it possesses in other animals, the lungs are compelled to take up the task, and they act powerfully both as excretory and absorbing organs. Their appearance after death shows sufficiently clear how much they have been taxed. While the lungs of cattle of three or four years old often do not present the slightest mark of disease, it is rare to find the lungs of a sheep of that age which are not thickly set with miliary tubercles.

Many of the functions of the skin being thus suspended or curtailed, it will not appear surprising that it should be found strangely thin compared with the size of the animal. On this account it can be employed for very few useful purposes, compared with that of the horse and ox.*

THE SCAB.

Among the diseases of the skin in British sheep the scab stands foremost in frequency of occurrence and mischief to the wool, the flesh, and the general constitution of the animal. The same disease, or one much resembling it, has been known in some parts of the world from time immemorial. †

It assumes different forms in different seasons and on different animals; or there are several varieties of it. A sheep is occasionally observed to scratch himself in the most furious manner, and with scarcely a moment's intermission. He rubs himself against every projecting part of the hedge, against every post, and the wool comes off from him in considerable flakes. When he is caught there is no appearance whatever of cutaneous disease. Mr. Young says, that "the sheep rub themselves in all attitudes—they have clear skins without the least sign of scab—never observed that it was catching—the better the food the worse they became—some few are taken as if mad, jumping and staggering about as if drunk, and they are wasted away, and die in three or four months: the flesh is then quite green, but not stinking."‡

This variety of the disease seems to have been most prevalent among the Norfolk sheep. It is evidently a disease more of the subcutaneous texture than of the skin itself; no satisfactory cause of it has been assigned, nor has any certain mode of cure been pointed out.

The sheep should be caught and housed, shorn as closely as possible, washed all over, and most carefully, with soap and water, and, after that, washed on every second day, and as long as may be requisite, with a lotion composed of equal parts of lime-water and a decoction of tobacco. The corrosive and arsenic lotion should be carefully avoided, as not only without good effect in a disease of this kind, but its application being attended by

* For a more detailed account of the skin, see p. 62.

† Ovid, speaking of a pestilence that prevailed in the Island of Ægina 1300 years before the Christian era, describes the falling off of the wool of the sheep, and their gradual wasting away:—

"Lanigeris gregibus balatus dantibus ægros,
Sponte suâ lanæque cadunt et corpora tabent."

Metamorph., lib. vii.

Livy speaks of a disease, *scabies*, so prevalent among cattle and sheep, in the neighbourhood of Rome, in the year 424 before Christ, that it was communicated to all the inhabitants of the country, and ultimately to the slaves.—Tit. Liv., lib. iv., cap. 30.

No author of modern times has described the mange or scab of sheep more graphically than Virgil in his Georgics.

All our earliest writers speak of it. Fitzherbert describes "the pockes that appere vppon the skyn of shepe, and wherof wyll dye many."

Mascall, Markham, and Snead, all acknowledge its prevalence, and the destruction which it causes; and there is not a French, or German, or Italian writer, that does not speak of the scab as one of the most prevalent and infectious, and ruinous diseases of sheep.

‡ Young's Annals of Agriculture, vol. xxxiv., p. 418.

much danger. A diluted mercurial ointment has been employed with advantage—one part of the common mercurial ointment, and seven of lard,—two or three ounces being well rubbed in every second day, and the application renewed not more than three or four times.

The scab in sheep is much akin to the mange in other animals. It is most common in the spring and early part of the summer. It may be produced by a variety of causes, such as bad keep, starvation, hasty driving, dogging, and exposure afterwards to cold and wet; thus producing suppression of the perspiration. The prevailing cause, however, is contagion.

The sheep, as in *the rubbers*, is restless—scratching itself with its feet—nibbling itself—tearing off the wool, or violently rubbing itself against every convenient place. When closely examined, the skin will be found to be red and roughened. There has evidently been an extensive eruption, and there still remain on various parts numerous pustules which have broken, and run together, and form small or large patches of crust or *scab*—hence the name of the disease—under which there is a sore surface if the covering is removed too soon. The shoulders and the back, most frequently, earliest exhibit these pustules. The general health of the animal is affected according to the extent and virulence of the eruption; sometimes he pines away and dies, exhausted by continued irritation and suffering. It is a most contagious disease. If it is once introduced into a flock, the farmer may be assured that, unless the tainted sheep are immediately removed, the whole of his flock will become infected, and sadly deteriorated in value; for they will afterwards be unfit to breed from in his own stock, and he must not sell them.*

It seems to spread among the sheep, not so much by direct contact as by means of *the rubbing places;* for it has happened, that when the farmer has got rid of his tainted flock, and covered his pastures with a new one, the disease has broken out again, and has been as troublesome and as injurious as before; and this has arisen from the gates, and other rubbing places not having been painted or taken away. The time which elapses between the infection and the appearance of the pustules has been ascertained with considerable precision; a circumstance of much importance in any legal inquiry with regard to the soundness of the sheep, and the liability of the seller. About the twelfth day the pustules begin to appear, very small and thick; and the animal is then first seen to ferret, or rub himself. The skin also becomes rough, and on being handled is found to be covered with small and hard salient points. Four days afterwards, from the rubbing and biting of the animal, the summits of the pustules are broken, and a purulent matter, which soon becomes concrete, escapes. This forms the scab, some of the wool falling off, and the fleece generally becoming irregular, hard, dry, and brittle.

The post-mortem appearances are very uncertain and inconclusive. There is generally chronic inflammation of the intestines, with the presence of a great number of worms. The liver is occasionally schirrous, and the spleen

* The following brief notice of a trial at the Norfolk Assizes, in July 1822, is extracted from the 'Farmers' Journal' of that period:—

Man v. Parker.

The action rose on a warranty of twenty score of sheep sold by the defendant to the plaintiff at Kenninghall fair as sound. The warranty was distinctly proved on the part of the plaintiff, and that shortly after he bought the sheep the scab appeared, by which disease fourteen of them died, and he lost three shillings per head on the remainder.—Verdict for the plaintiff, 73*l.* 6*s.*

enlarged; and there are frequently serous effusions in the belly, and sometimes in the chest. There has been evident sympathy between the digestive and the cutaneous systems.

The scab is clearly a permanent and increasing irritation of the skin, under the form of a pustular eruption; its effects on the general health have not been evident at first, but some becoming so in a disposition to chronic inflammation of all the digestive organs.

It has now been clearly ascertained that the scab in sheep, like the mange in cattle, horses, and dogs, and the itch in the human being, is connected with, and propagated by certain minute insects belonging to the class of the *Acari*, and which inhabit these pustules. The disease spreads over the animal by means of these animalculæ, and is communicated to the rest of the flock in the same way. As soon as the pustule begins to dry up the acarus leaves his first habitation and travels to another part of the skin, into which it burrows, and so extends the disease. While thus travelling it may be easily conveyed to the skin of another animal with which the infected one comes into contact; or it may be left on the rubbing post, and entangled in the wool of the next visitant.

M. Walz, a German veterinarian, has clearly traced these operations. If one or more female acari are placed on the wool of a sound sheep, they quickly travel to the root of it, and bury themselves in the skin, the place at which they penetrated being scarcely visible, or distinguished by a minute red point. On the tenth or twelfth day a little swelling may be detected with the finger, and the skin changes its colour, and has a greenish blue tint. The pustule is now rapidly formed, and about the sixteenth day breaks, and the mothers again appear with their little ones attached to their feet and covered by a portion of the shell of the egg from which they have just escaped. These little ones immediately set to work, and penetrate the neighbouring skin, and bury themselves beneath it, and find their proper nourishment, and grow and propagate, until the poor animal has myriads of them to prey on him and to torment him, and it is not wonderful that he should speedily sink.

M. Walz placed some of the male acari on the sound skin of a sheep, and they, too, burrowed their way, and disappeared for a while, and the pustule in due time arose; but the itching and the scab soon disappeared without the employment of any remedy. Therefore the scab can be communicated from sheep to sheep only by means of the mediate or immediate contact of the sound animals with the diseased, or, as they lie by each other in the fold, the impregnated acari travelling from the infected to the sound sheep. Still, however, there is a power of selection, and that to a very considerable extent. The old and the unhealthy sheep are first attacked, and the long-woolled sheep in preference to the short; a healthy short-woolled sheep will long bid defiance to the contagion, or possibly escape it altogether. This power of selection, if it may be so termed, manifestly exists with regard to all kinds of cutaneous affections both in the human being and the quadruped. The rubbing post, or any projecting substance, by working against which the animal can somewhat ease his torture, is a fruitful source of infection, for on such a body these acari must be plentifully deposited, and are partially or entirely communicated to the next comer.

The following cut, copied from M. Walz's work, contains drawings of these insects higher magnified. They are very different in form, size, and colour from the insect which is connected with, or the cause of the itch of the human being.

Fig. 2.

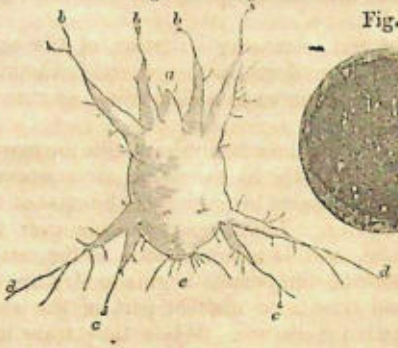


Fig. 1.



Fig. 3.

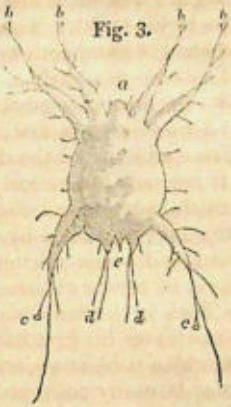


Fig. 1.—The insects of their natural size on a dark ground.

Fig. 2.—The female, of 366 times the natural size, larger than the male, of an oval form, and provided with eight feet, four before and four behind.

a.—The sucker.

b. b. b. b.—The four anterior feet, with their trumpet-like appendices.

c. c.—The two interior hind-feet.

d. d.—The two outward feet, the extremities of which are provided with some long hairs, and on other parts of the legs are shorter hairs. To these hairs the young ones adhere when they first escape from the pustule.

e.—The tail, containing the anus and vulva, garnished by some short hairs.

Fig. 3.—The male on its back, and seen by the same magnifying power.

a.—The sucker.

b. b. b. b.—The fore-legs with their trumpet-like appendices, as seen in the female.

c. c.—The two hind legs, with the same appendices and hairs.

d.—The rudiments of the abdominal feet.

e.—The tail.

Every litter of these parasites comprises, according to our author, from eight to fifteen little ones. The females become in a very short space four times their first size. The acarus newly hatched, and kept in a dry place, dies in a few days, and crumbles into dust. The more adult insects become dry, and perish more or less slowly, according to the state of the atmosphere, whether dry or moist; but when the summer has passed over, and the insect has become old, it retains its life from the autumnal to the spring equinox, or during the whole of the winter—a very important fact, and illustrating the difficulty of getting rid of scab when it once spreads among them, and also its occasional return in the spring, when no labour had been spared to conquer it in the preceding summer and autumn.

The scab is often produced by certain exciting causes, as neglect and mismanagement, as well as conveyed by contagion. In this respect it only follows the law by which many other diseases are governed. Worms will multiply in the intestinal canal when they have once begun to have existence there: the fluke will fill every biliary vessel when the existence of the rot has established it in the liver, and the acarus of scab will continue in its cutaneous or sub-cutaneous dwelling when it has once been placed there: but the question yet remains unanswered, how came they first to have existence; for they have not yet been observed in any other form or state? Physiologists are fast acknowledging the working of a mysterious but noble principle—the springing up of life under new forms, when the component principles of previous beings are decaying, or have seemingly

perished. Thus if we macerate any vegetable substance the fluid will teem with myriads of living beings, called into existence by the process we are conducting; or rather by that power of nature, or that principle which was bestowed by the Author of Nature, that life, ceasing in one form, shall spring up in others, and this while the creation lasts. Thus we have probably the hydatid in the brain of the sheep, and the fluke in its liver—parasitical beings which we recognise in no other form, and in no other place. *They were the product of the disease of the part.* In like manner the acarus of scab may be called into existence by the derangements which our neglect, or unavoidable accident, or disease, may have made in the skin of the sheep. Scab may be, and is, of spontaneous origin, as well as the product of contagion, and the acarus, having sprung into life within the pores of the skin, obeys the laws of all living beings, as to its after existence and multiplication.

The cure of scab, then, lies in the destruction of this insect. This is a simple and most important view of the case. The essence of the disease is the existence of, and the irritation caused by, this acarus; the cure is the removal or destruction of the tormentor. Then the question as to the form under which the remedy is best applied is immediately answered. The washes, whether infusions of tobacco, or hellebore, or arsenic, are somewhat objectionable. We can never be certain that they are brought into contact with the diseased part—the natural yolk of the wool may be interposed—the dense crust which is the product of the disease may be interposed—or if that is not the case, can the simple application of a fluid of this or of any other kind reach or destroy the insect concealed in the pustule, or perhaps only in its infant state, and deeply buried in the substance of the skin? These washes have often succeeded; and if not made too strong—not in a greater proportion than half a pound of the arsenic to twelve gallons of the water—they may be still resorted to by those who are accustomed to their use; but more care than is usually taken should be exerted, in order that the fluid may penetrate to every part of the skin, and which would be ensured by a previous washing with soap and water. The arsenic, that necessarily remains about the wool when the water has dried away, would probably destroy the acari almost as fast as they are produced. When a greater quantity of arsenic has been used, or the sheep has been kept too long in the water, fatal consequences have occasionally ensued.

A safer and a more effectual method—destroying the insect and benefiting the wool—is the application of a mercurial ointment. It had long been in frequent use among sheep-masters as a cure for the scab, but had got into some disrepute from its having been made too strong, and applied in too large quantities, and thus salivating some of the lambs and the pregnant ewes. The ointment should be made of two strengths. That for bad cases should consist of common mercurial, or Trooper's ointment, rubbed down with three times its weight of lard. The other, for ordinary purposes, should contain five parts of lard to one of the mercurial ointment. The operator should begin with the head of the sheep, and rub a little of the ointment well into it. A shred or furrow should then be made from the head to the tail, and in such a manner that the skin is exposed. A little of the ointment should then be applied with the finger to the skin along the whole of the exposed surface. Another furrow should then be drawn on either side; and in this way over the whole sheep, the furrows not being more than four inches apart. When any of the scabs are easily moved, they should be taken away; and, last of all, the whole of the ointment that has been thus applied to the furrows must be well and thoroughly rubbed in. The quantity of ointment

applied to each sheep may vary from a few drachms to two ounces, one-third of the quantity being used for a lamb.

The sheep that has been thus dressed may be considered at least as incapable of infecting any of the others; the itching will soon subside; the acari will either be destroyed by the mercury as soon as they appear on the skin, or it will penetrate to their deepest recesses and poison them there; or if, at the expiration of ten days, there should continue to be much uneasiness or itching, another but a lighter dressing may take place.

This ointment will have a kindly effect on the roots of the wool, encouraging their growth and that of the natural yolk, and forming a comfortable and most useful defence against the cold of the ensuing winter.

ERYSEPELATOUS SCAB.

This disease, or perhaps cutaneous eruption, without the presence of the acari of scab, sometimes assumes acute and erysepelatous character. Mr. Stevenson describes it under the objectionable term of "Red-water," thus rendering it liable to be confounded with acute inflammation of the bladder or peritoneum. He says that "it consists in an inflammation of the skin that raises it into blisters containing a thin, reddish, and watery fluid. These continue for a short time, break, and discharge their matter, and are followed by a blackish scab."* This is a rare disease. A little blood should be abstracted, and a purge of Epsom salts administered. Local applications will seldom be necessary, except there should appear to be much burning and itching, and then a little sweet oil, or camphorated oil, will afford relief.

The *Wild-fire*, or more extensive vesication and torture, and to a certain degree infectious, has occasionally existed as an epidemic.

The *Ignis sacer*, or violent cutaneous inflammation of the skin of the sheep, is occasionally mentioned in every history of the epidemics of sheep. As, however, a disease to be traced to any definite cause, and attacking solitary individuals of the flock, and thence communicated to others, it is unknown.

The leg evil, or black leg, of Sir George Steuart Mackenzie, has been already alluded to.†

* Hogg on Sheep, p. 189.

† The sheep in France, and on the greater part of the continent, used to be subject to a dreadful pustular disease, principally propagated by contagion, yet thought by some to rage at times as an epizootic. Scarcely a sheep escaped its attack in some period of its life. It never reached Great Britain, although it has thinned the sheep-flocks in every district of France opposite to the English coast. It was termed *La Clavelée*, and the virus by means of which it was propagated was called *Le Claveau*.

It was a peculiar eruption chiefly, and always at first appearing on the parts that are most denuded of wool, as the inside of the arms and the thighs, under the belly and tail, on the teats, the scrotum, and around the eyes and nose, and not unfrequently spreading at last over the whole surface of the body. These pustules contained a purulent fluid, highly infectious, and when that is secreted they become dry, and fall off. *La Clavelée* appears at all seasons of the year, and attacks without distinction the strong and the weak, selecting, however, the lambs in preference to the adult sheep. The animal in whom the disease has once been fully developed is ever afterwards free from its attacks; but a full half, and frequently two-thirds of the flock are destroyed by it.

The contagion was communicated in a variety of ways, or in almost every possible way—the slightest contact was sufficient to accomplish the purpose. A portion of the virus seems to be detached from the sick animal by everything which it touched, and there it remained for an indefinite period, retaining all its dangerous properties. Direct individual communication did not seem to be necessary. If it broke out in a flock, it was almost sure to be communicated sooner or later to all that were within a few hundred yards of it. It might be unknowingly conveyed, and probably was, by the butcher, the shepherd, the dog, the sheep merchant, and the medical attendant. It spread by

LICE AND TICKS.

There is a species of louse peculiar to the sheep, which occasionally exists in almost incredible numbers, associated with common scab, or connected with or producing an eruptive disease somewhat resembling the scab. This

means of the transport of the wool and the skins. If a sound flock was turned into that in which a diseased one had been pastured two or three or four months before, or if it was driven along the same road over which an infected flock had lately travelled, the malady was sure to be developed. It was for many a century the scourge and the destruction of the sheep. In the regular clavelée there were four distinct periods; first, the symptoms which preceded the eruption, as dullness, loss of appetite and strength, and debility, marked by a peculiar staggering gait, the suspension of animation, and slight symptoms of fever. This continued during about four days, when commenced the second period, or that of eruption. Little spots of a violet colour appeared in various parts, and from their centre there sprung pustules accompanied by more or less inflammation, isolated or confluent, and with a white head; their base was well marked and distinct, they were surrounded by a red areola, and their centre was flattened. They were larger than an ordinary lentil. In some animals they were confined to few spots, in others they spread over the whole body. They were scattered here and there, or disposed in the form of beads, or congregated together in a mass.

When the disease was not of an acute character, and the eruption was not considerable, and the febrile symptoms were mitigated as soon as the pustule was developed, there was not much to fear. The eruption ran through its several stages, and no serious disorganization remained; but in too many cases the whole of the integument became reddened and inflamed, the flanks heaved, the pulse, whether strong or obscure, increased in frequency, the mouth was hot, the conjunctiva red, the breath fœtid, the head swelled, the eye-lids almost closed; rumination had ceased, the muscular power was exhausted, the pustules died away with little apparent fluid secretion, a fœtid diarrhœa ensued, and death speedily took place.

The progress of the eruptive stage of the disease was frequently, however, a very unsatisfactory one. When the pustule had risen, and the suppuration had commenced, a new state of febrile excitement ensued, accompanied by more than usual debility. It lasted from three to four days, and during its continuance the pustules became whiter at their summit, and the fluid which they contained was of a serous character, yellow or red, transparent or viscid, and by degrees it thickened and became opaque, and then puriform; and at this period, when danger was to be apprehended, a defluxion from the nose ensued, and swellings about the head, as already described.

This was the contagious stage of the disease, and when it was too easily and fatally transmissible by accidental contact or by inoculation.

Then came the last stage, that of desiccation, and about the twelfth day from the commencement of the disease. The pustules subsided, or the integument gave way, and the fluid which they contained escaped, and a scab was formed of greater or less size and density, yellow or black, and which detached itself bodily, or crumbled away in minute particles or powder. The contagion was now at an end, and the animal recovered his appetite and spirits and strength. This stage of desquamation frequently lasted three weeks or a month.

A secondary eruption occasionally followed, of an erysepelatous character. There were no distinct suppurating pustules; but there was a more serous or watery secretion, which soon died.

This was the regular and the fortunate course of the disease; but too frequently there was a fatal irregularity about it. Almost at the commencement there was excessive fever, and prostration of strength, and fœtid breath, and detachment of large patches of the wool, and more rapid and bounding or inappreciable pulse, and strange swellings about the throat and head, and difficult deglutition. There was also a discharge of adhesive spumy fluid from the mouth, and of ichorous or thick, and yellow, or bloody, and fœtid discharge from the nostrils, often completely occupying and obstructing them. The respiration became not only laborious, but every act of it could be heard at a considerable distance—there was a distressing cough—the lips, the nostrils, the eye-lids, the head, and every limb became swelled, the pustules ran together, and formed large masses over the face, and the articulations: diarrhœa, that bade defiance to every medicine, ensued, and the end was not far off.

Medical men were much struck with the resemblance between this disease and the small-pox of the human being, and they believed them to be identical; and every shep-

louse, the *hiphobosca ovina*, is small and active, and of a brown colour, principally tormenting lambs and hog-sheep that are out of condition. Professor Gohier relates a case in which these insects were so numerous, that after the lambs had lain a little while in the sun, they appeared to be of a brown colour; all the lice by which they were infested had crept to the

herd, of course, adopted this opinion, and the clavellée of the sheep was supposed to be the small-pox of the human being, modified by certain differences of structure and function. This, however, was very erroneous. There was an evident difference in the pustule; that of small-pox was developed in the texture of the skin, and surrounded by a rose-coloured areola—that of the clavelée was evidently more deeply seated; it reached to the subcutaneous cellular tissue, and it was surrounded by an areola of a far deeper colour. The virus of small-pox was usually contained in a simple capsule, which elevated the scarf-skin—the virus of the sheep-pox seemed to be more diffused through the cutaneous and subcutaneous tissue, and there was abundantly more swelling and inflammation. The matter of small-pox was first limpid; it then became turbid, puriform, and at length assumed the form of white or yellow, or thick pus, which became concrete, and a scab was formed which became at first yellow, and then brown, and then black, and when it fell off left an impression, or depression, more or less distinct, on the surface of the skin. The pustules of the sheep-pox, before there was any appearance of pus degenerated into scabs, or formed a hard or thick crust, under which the pus accumulated; and when that scab fell off, there was a sore left behind, or sometimes a deep ulcer. There were other particulars of disagreement, but these would be sufficient to prove that they were not identical diseases.

The treatment of this disease was necessarily very simple. It consisted first in separating the sound sheep from the diseased, and to be careful that, having been thus separated, they were not subjected to the influence of cold or wet, or insufficient food.

The diseased sheep were supplied with wholesome food—during the febrile stage aperients of Epsom salts were administered:—the state of fever having passed, mild tonics, as gentian and ginger, were administered, the Epsom salts being still retained, but in smaller doses. Common salt was a favorite, and a very useful medicine, on account of its antiseptic and tonic properties.

About the end of the seventeenth century, it was discovered that the virulence of the small-pox could be modified and controlled by artificial means, and by those which would appear, at first sight, to have a kind of daring about them. The child was inoculated with the virus taken from an otherwise healthy subject, and a disease of a milder character—milder to a degree that was scarcely credible—was produced. Half a century and more passed before the experiment was tried on the sheep; but about the year 1760 it was attempted, and with the most perfect success. A disease with every character of the sheep-pox was produced; but much more mild, which rapidly ran its course, and left no bad consequence behind. This was not immediately acknowledged:—the operation was ridiculed and abused at first, but experience has proved that it is an invaluable one. It is now adopted by almost every continental sheep-master. When the sheep-pox used to break out in a flock, the owner lost a third, and sometimes a half, and sometimes three-fourths of his stock. He now inoculates them, and he does not lose more than one in a hundred. The professors of the veterinary school at Alfort say that not more than 1 sheep in 400 is lost. When it is seemingly followed by disastrous consequences, it is because it is delayed until la clavelée has actually broken out in the flock, and then the loss of those that die of the natural disease is unfairly attributed to the inoculation. Whenever the natural disease appears in his neighbourhood, it is now acknowledged to be the duty of the sheep-master to subject the whole of his flock to inoculation; and the greater part of the owners of sheep to inoculate all the lambs. The immunity lasts during the life of the animal. The spring and the autumn are the most favorable periods for inoculation, and the sooner after the weaning of the animal the better. The ear, or the inside of the fore-arm, or the thigh, are the parts usually selected for the inoculation.

In process of time inoculation with the *vaccine* matter was introduced into Great Britain as a preservative against the small-pox, and the French veterinarians very naturally put the power of the vaccine matter to the test as a preservative against the sheep-pox. It had power, and to a very considerable degree. An experiment was made on a very large scale; 1523 sheep were vaccinated, and the disease passed through its different stages. They were all afterwards inoculated with the matter of sheep-pox, and in 308 of them the disease was produced in the usual mitigated form after this operation. Other experiments were made on a smaller scale, and with a similar result; and, therefore, the vaccine inoculation is now abandoned on the continent, although it

outside of the wool.* Tobacco juice, mercurial ointment, and arsenic, are the three drugs usually resorted to in order to destroy them. The tobacco water kills them almost immediately, and so does the mercurial ointment; but the latter should not be used too late in the year, nor when the weather is cold and wet. The mercurial ointment, however, is to be preferred on account of its salutary effect on the skin of the animal, and the growth of the wool. The weaker of the preparations just recommended for the scab should be used.†

The *sheep-tick* is a formidable insect. Its instruments for piercing the skin, and almost burying its proboscis and its head within it, are three in number, but it adheres so firmly to the skin chiefly by means of its six legs, which are exceedingly muscular and powerful, and armed with strong double serrated claws. It is a nimble animal, and runs quickly enough about the sheep in search of some favorite spot, and when it has fixed itself there it will hang for weeks and months together. It seems as if it had lost the power of extricating itself, for it never voluntarily comes away. It is sometimes found as large as a horse-bean. It propagates with much rapidity, although not to be compared with the sheep-louse.

It is useless to attempt to force it from its hold; but it will usually yield to the application of the mercurial ointment well rubbed upon and around, or common turpentine, or even linseed oil.

THE FLY.

Towards the middle of May, and especially in a woody district, or where the fences are high, certain species of flies begin to deposit their eggs on the wool of the sheep. If the animal labours under diarrhœa, the excrement accumulates and putrefies around the tail, and they will be

gives immunity to four-fifths of those that have been subjected to it, for inoculation with *le claveau*, on the virus of the sheep-pox, will give immunity to all.

There is one disadvantage attending the use of the claveau, that it retains its power not more than a few days, whatever care may be taken of it. The vaccine matter retains all its properties for a much longer period.—See Vatel and Hurtrel D'Arbroval, Articles *Clavelée*, *Clavelisation*, and *Vaccination*; also some valuable remarks on this subject in the works of Gasparn, Tessier, Lullin and Gohier.

* Mémoires et Observations, vol. ii., p. 98.

† Professor Gohier describes a curious experiment that was made on the relative value of certain applications for the destruction of lice. He had twenty-three lambs that were eaten up by lice and mange. He applied to six of them a decoction of white hellebore —a decoction of tobacco to six others—of stavesacre to another six—and five he washed with a saturated solution of kitchen salt. On the second day, about half of the vermin were dead. The applications were repeated, and two days afterwards not more than one-fourth of the parasites remained alive, and they were found in the neck, where they are always most numerous. The tobacco and the hellebore had produced the greatest effect, for before the second application of the lotion a multitude of dead lice were found in the wool, and those that remained were seemingly half dead—they were lying on the surface of the skin almost without motion. The stavesacre had killed a great many, but the insects that remained were as vigorous as ever. The salt had also killed many, but those that remained attached themselves firmly to the skin.—Mémoires et Observations, vol. ii., p. 101.

Mr. Hogg alludes to an occasional consequence of the annoyance of lice. An instance of it certainly never came under the observation of the author of this work. "They," (the lice,) "mostly breed about the throat, or under part of the neck, where their eggs are often to be seen in great numbers, and great care should be taken to smear the hogs particularly well about these places, for if any of them are left there, the animal is in great danger of being *kridled*. This is occasioned by the animal's bending its neck extremely, in order to claw its throat with its teeth, on which occasions the teeth often fasten in the wool, so that it cannot disengage them, and it soon loses the power of its neck. I have known several die in this way, and many more who, if they had not been relieved, must necessarily have perished."—Hogg on Sheep, p. 100.

first deposited there, or on any accidental wound. The maggots are scarcely hatched before they begin to burrow under the skin, and sadly torment the sheep by the severity of their bites. The very commencement of the mischief can scarcely fail of being observed by the attentive shepherd. The sheep are evidently uneasy, hanging down their heads, stamping, shaking their tails, running, and biting themselves. Mr. Price says that a looker's dog, when properly trained, the moment he enters a field in which are any sheep struck with the fly singles out the diseased animals.

The head is a part very much exposed to the attack of these insects. It is comparatively bare of wool, and the flies can more readily get at the skin; the sheep, in their impatience, bruising and wounding their heads with their hind feet, the flies become doubly numerous and troublesome, and the sores spread, and sometimes become dangerous. A plaister, composed of a pound of pitch, and two drachms of bees' wax, melted together, and spread while warm on soft leather, or even on linen cloth, is with much advantage applied to the head when it begins to get sore; sometimes it is used as a precautionary measure before the soreness commences. It covers the head, and heals it if sore, and prevents the future attack of the fly. Some persons apply it while warm, without any leather or cloth; and then scatter a little short wool over it; and others sew the plaister round the head.

When the fly attacks other parts, the wool should be carefully parted or cut away, and some spirit of tar freely applied; this will destroy the maggots that are already deposited, and the smell of the tar will prevent the approach of other flies. Mr. Hogg asserts that the coarsest kind of fish oil will always prevent the attack of the fly. "I happened," says he, "to be assisting at the sorting of a stock of sheep of the Cheviot breed, when sundry of their heads were broken by the flies. The shepherds brought them out of the fold with the intention of smearing the sore parts with tar. I advised them to anoint them with coarse whale oil, such as they mix among the tar, having several times seen sores softened and healed by it. Some of it being near at hand, they consented. The flies were at this time settled upon the fold in such numbers that when we went in among the sheep we could with difficulty see each other, but those anointed with the oil were turned in among the rest, and to our utter astonishment in less than a minute not a fly was to be seen." The wool that is anointed by this oil never quite loses the smell of it until scoured; therefore, a few drops of it sprinkled on the sheep at the beginning of the season, would probably keep the flies from troubling them during the whole of the summer *.

SHEEP-SHEARING.

The proper time for this operation must depend on the climate, the earliness or lateness of particular seasons, and the breed and condition of the sheep. Some sheep will be ready as early as the middle of May, and especially if they have been neglected in the winter months, and little nutriment could be spared for the fleece, and it has remained on the back of the owner almost a dead substance. It is then more easily and quickly displaced by the growth of the new wool underneath. The sheep may be said to be ready for shearing when the old wool has fairly risen from the skin, and a coat of new wool covers the skin. The extremes of heat and cold are as injurious to the sheep as to other animals, and there should be a complete covering of new wool before the old one is taken away. An early and a

* Hogg's Shepherd's Guide, p. 110.

warm spring will make a great deal of difference in this respect. Some time in June will generally be the period selected, depending on the state of the sheep, and which the experienced sheep-master will in a moment perceive. It is bad practice, however, to drive it off until the middle or the end of July, under the notion that there will be a longer fibre and consequently a heavier fleece. This will rarely happen; the old fleece will have separated, and a portion of it fallen off, and the fly will have had longer time to be busy, and will sometimes have done irreparable mischief; while the new fleece will have been stinted in its growth, or part of it will be uselessly removed by the shears.

Usage, from time immemorial, has determined that the wool shall undergo a certain purification on the animal's back before its submitted to the shears; therefore some running stream or pond—the former, if possible, is selected—into which the sheep are driven one by one, where they are well rubbed and hand-washed, until the dirt is got out of the fleece. They are then suffered to swim ashore, where there is a clean pen, or a clean and dry pasture, or rick-yard to receive them for a few days, or until they have got thoroughly dry*.

Some have advocated the use of warm water for the washing of the sheep, as removing the danger of the men taking cold; and also preserving the sheep from the same danger, and more effectually cleansing the fleece; and also as affording, in the water of the first and second washing, a fluid rich in animal soap, and constituting one of the most fertilizing manures that

* How beautiful is Dyer's account of this!—

First, however,
Drive to the double fold upon the brim
Of a clear river, gently drive the flock,
And plunge them, one by one, into the flood.
Plunged in the flood, not long the struggler sinks
With his white flakes that glisten through the tide:
The sturdy rustic in the middle wave
Awaits to seize him rising; one arm bears
His lifted head above the limpid stream;
While the full clammy fleece the other laves
Around, laborious, with repeated toil;
And then resigns him to the sunny bank,
Where, bleating loud, he shakes his dripping locks.
Dyer's Fleece, Book I.

An anonymous but valuable writer in the "Quarterly Journal of Agriculture" gives the following account of washing the lowland sheep—the mountain or heath sheep being generally compelled to swim across a pool of water several times:—"At least three and at most four men will be necessary to stand in the water, so arranged that the first man shall be the lowest down the stream, and the last man shall be the shepherd himself. There should be plenty of hands to keep the sheep near the edge of the water, for the ewes are apt to wander away in search of their lambs, which should be left at the homestead on this occasion. Everything being thus prepared, the first man at the water's edge should get a sheep brought towards him which he seizes and pulls into the water, and immediately turns over on its back, holding the arm of the fore-leg with the left hand, and grasping a portion of the wool at the side of the head with his right hand. He swings the sheep in the water, turning it over on the one side and the other, while at the same time he pulls it gently backwards and forwards, to and from him, at every successive turning. In this process the wool waves up and down in the direction of the length of the body, and twirls round the body, first in one direction and then in another. He then hands the sheep to the next washer, who repeats the same operation, and he to the next, till the shepherd gets it, who after feeling the skin with his hand, and judging by the clear state of the water of the cleanly condition of the animal, dips him over the head and turns him gently over on his feet, and assists him up the grassy bank, where he stands dripping and woe begone. At length twirling his wool like a mop, and making the spray fly from him in a shower, he forgets the rough handling he has passed through, and begins to crop the green herbage."—Quart. Journ. of Agric., vol. iii., p. 867.

could be applied. In general, however, the wool is sufficiently cleared by the old system, and the danger to the men and the quadrupeds is not so great as has been represented.

About a week is now suffered to elapse in order that the fleece may become sufficiently dry, and also that the new yolk, which is secreted with wonderful rapidity, may penetrate through it. The weight of the fleece will be somewhat increased, and, what is of much more consequence, a new softness will be communicated to the wool.

It should be received as a fundamental principle of sheep-shearing, that the more perfectly it is performed the greater will be the succeeding crop of wool. The operation is thus described by the writer in the "Quarterly Journal:"—"A barn or shed into which plenty of light can be admitted near the shearers should be selected, and a part of the floor covered with a large canvass sheet, on which two shearers can operate. The sheet should be nailed down, and a little straw placed under it to soften it as a cushion. The floor of the barn should be swept out quite clean, and a light broom should be at hand to sweep the sheet when necessary. Everything being arranged a shearer seizes a sheep, and sets it on its rump, and keeps it in this position by resting the back against his own legs. He removes all straws, thorns, burs, &c., that may have adhered to the wool. While thus held, the wool is removed from the head and neck so far as the shoulders, and also from the belly, the scrotum, and the edge of the thighs. The head of the animal is then bent down sideways, and the shearer, placing a leg on each side of the neck of the sheep, pushes out the opposite ribs by pressing his knees gently against the ribs that are nearest to him. He next shears the wool from the far side with his left hand, from the belly to the middle of the back, and as far down as the loins. The sheep is now turned, and the right hand is employed to shear the wool from the near side. The sheep is then laid flat on its side, and kept down by the shearer with his face towards the rump of the sheep, resting his right knee on the ground in front of the neck, and his right toe being brought to the ground a little behind and below the poll; the head and neck of the sheep are thus confined by his right leg, while he uses his right hand to shear the wool from the hind quarter. In this way the clips of the shears will appear in concentric rings round the body of the sheep. The dirty portions of wool about the tail are then removed by the shears and kept by themselves; the outside of the fleece is folded inwards, beginning at the sides, and narrowing the whole fleece into a stripe about two feet wide. This stripe is then rolled firmly up from the tail end towards the neck, the wool of which is stretched out and twisted into a rope, and wound round the fleece to give it a cylindrical shape*."

Since the alteration in the character and destiny of the short wool, its total exclusion from the fine cloths, and its increased value as a combing wool, the practice of shearing the lambs has fallen very much into disuse, and the fleece, under the name of hogget wool, is suffered to remain until the second shearing time; it then produces a considerably higher price than the ewes' wool, and constitutes the greater part of the remuneration which the breeder derives from the fleece.

As soon as the sheep is shorn, the peculiar mark or brand of the owner is placed upon it. It used to be composed of ochre or tar, or other substances which were afterwards very difficult to be removed, and therefore lessened the value of the fleece. A superior material is now used, composed of lamp-black and tallow melted together, a small quantity of tar being super-

* Quart. Journ. of Agric., vol. iii., p. 868.

added. This will not be washed away by any storms to which the sheep may be exposed, but will readily yield to strong soap-suds *.

The ewe is now dismissed to her lamb. There is, however, a great degree of confusion, neither the dams nor their young being able to distinguish each other so readily as before. This embarrassment seems not to arise so much from the loss of the fleece, which may occasion an alteration in their appearance, as from the defect of that long-recognised smell which had characterized each individual personally, and which is also rendered more doubtful by the strong scent of the tar and the tallow, by which they have been newly marked. The brute creation recognise each other more from the smell than the sight, and in matters of identity and diversity appeal much more to their noses than their eyes †.

To one circumstance more allusion must be made—namely, the practice of shearing the fat sheep early in the spring. There is scarcely a Smithfield cattle show in which, in the dead of winter, two or three sheep, just shorn, —certainly in a very neat and tasteful way, and every excellent point of the animal displayed,—are not exhibited. Some excuse may be made for this, for the sheep are brought to the metropolis in closed carts, and are shown in a place where the winds of heaven cannot visit them too roughly, but what shall be said of a drove of naked sheep going to market in the early part of March—the east wind cutting like ice, and their eyes and nostrils nearly closed with mucous? This is done for the sake of the little additional profit to be derived from the wool. Is that profit really derived? Has not the unfeeling owner miscalculated the matter? Let him, or let any thinking or humane man, compare two pens of sheep close by each other. In the one the animals retain their natural covering, and they are full of health and vigour; the inhabitants of the other hang their heads with cold and disease, an unpleasant rheum is discharged from their nostrils, and the eye of the sheep, that never deceives when the question of health is to be decided, tells tales, far too intelligibly, of pulmonary diseases, and of constitution undermined, and of everything to disgust rather than attract. Has not the unfeeling owner miscalculated the matter? He will say, perhaps, that the sheep will not travel well in their fleece. In the heat of summer they will not; but when the winds blow chilly, no system can so surely promote the health of the animal, as that which secures to him the feeling of comfort ‡.

SALVING OR SMEARING.

The question of *salving* or *smearing* is entirely one of locality. It is not possible to preserve sheep exposed to the vicissitudes of the weather in high and open districts without the application of some substance to the fleece. The grand object to be gained is protection from the wet and storm; a second is to promote the growth of the wool, and to improve its character. The influence of intense cold would be to stint the growth, and to give a harshness to the quality of the wool. A third object desirable to be accomplished, is to destroy injurious insects, and to prevent those diseases of the skin, to which sheep in exposed situations are exceedingly liable. The smearing mixtures were therefore composed of substances which seemed most likely to accomplish these purposes. The tar, by matting the wool, rendered it almost impossible for wet to penetrate it. It also destroyed the

* The Complete Grazier, p. 263.

† See White's instructive and beautiful Natural History of Selborne, p. 365.

‡ John Lawrence, a name scoffed at by the ignorant and the brutal, but identified with the cause of humanity, has taken a similar view of the subject.—Lawrence on Cattle, p. 368.

insects which might harbour in the skin, and readily cured many cutaneous disorders. The butter preserved the tar from becoming too tenacious or concrete, or communicating a certain harshness to the wool; and it also promoted the growth of it, and either gave it softness or preserved its natural softness. Many tons weight of damaged butter were, and are yearly, sent into the Highlands for this purpose. It was, however, found that the tar communicated an indelible stain to the wool, which could never be used for white goods; nor would it take some of the most brilliant colours: therefore the wool on which the salve was employed was deteriorated in value. It was called the *laid* wool, and was usually from 1*s.* to 2*s.* per Scotch stone of 24 lbs. lower in price than the *white* or unsalved wool.

It was a great object with the sheep breeder to get rid of this stain, by substituting something instead of the tar. Among many experiments, some made by Mr. John Graham, of Newbigging, are deserving attention. He left the tar entirely out of the question, and he used instead of it yellow resin. He melted together 18 lbs. each of butter and hog's lard, 12 lbs. of resin, and two Scotch pints, or a gallon, of Gallipoli oil—an oil used in washing or cleaning of wool or cloth, taking away every stain, and leaving the wool perfectly white. This was sufficient for fifty-five sheep, and the cost of the smearing of each sheep was about 4½*d.* He found this wool, when washed, equally valuable with the white wool, and producing a considerably higher price than the laid wool *.

Future experiments must decide on the value of this and other salving mixtures. They are indispensable, and there can be no doubt that, in process of time, a method of preventing the stain of the tar will be discovered.

The use of a small quantity of some oleaginous or greasy application immediately after shearing will likewise be gradually acknowledged. The protection which it affords to the almost denuded skin, its substitution for the natural yolk, which is not in its full quantity immediately secreted, and the softness which it will impart to the wool, are circumstances well deserving of attention.

Chapter XVIII.

THE GRAZING AND FATTENING OF SHEEP.

The system of sheep-feeding varies so much with the breed, the pasture and the winter provision, that it is difficult to lay down any rules that will admit of general application. This difficulty is increased by the very different manner in which farms of the same character are managed according to the caprice of the owner.

A favourite system with many sheep-farmers is to purchase pregnant ewes in the autumn—to keep them on somewhat inferior food during the winter—to give them better provender as the lambing season approaches, and, after that, to improve their keep still more, in order that the lambs may be ready for the early market, and the ewe herself sufficiently fattened before the end of autumn. Others purchase lambs in August or September; keep them in inferior store-condition until the spring, and then fatten them as quickly as possible, and clear the whole off the ground before Michaelmas.

* Price's Essays and Transactions of the Highland Society, vol. ii., pp. 4 and 244.

Others, again, purchase sheep in store-condition at all seasons. They bring them forward with the best food which their farms will afford, and sell them as soon as they are ready for the butcher.

In many parts of the country the sheep have nothing but what the pastures will afford, except a supply of hay, according to circumstances, during the winter. Considerable management is required here. Sheep suffer materially from being driven backwards and forwards to different parts of the farm. It is always a considerable time before they will quietly settle down in a new pasture, and sometimes they decline considerably in condition by means of the change and their discontent with their new residence. In an enclosed country sheep generally do best when they are separated into rather small parcels; they feed more quietly, they eat less, and they waste less. When as many sheep are put upon a fair-sized pasture as it will properly keep, they will be cleared off considerably earlier than if they were put in larger numbers on more extensive grounds. Grass land, in small divisions, will keep and fatten many more sheep than when they are of a greater extent.

There are few circumstances to which the farmer is so inattentive as the nature and quality of the produce of his pasture land whether open or enclosed; the grasses of which particular animals are fondest, and on which they thrive best; the kinds of grass which he should have on his meadow lands; those he should cultivate on his permanent pasture; and those that should cover his higher ground. He can tell which produces the heaviest crop, but he knows not in which the nutritious principle most prevails, or what period of the spring or summer, or how permanent or transient its best time may be.

The present Duke of Bedford entitled himself to the best thanks of the agriculturist when he instituted a course of experiments on the time of flowering and seeding, and the produce and nutritive quality of every known kind of British grass. The time of flowering and seeding, and the weight of produce, and, so far as this goes, the comparative value of each of the grasses at this period is a most important object to ascertain. The proportion of nutritive matter is still more important: for although it is the case in the quadruped, as in the human being, that it will seldom happen that two individuals will gain equal weights of flesh from equal quantities of the same kind of food, yet when the experiment is tried on a large scale there will be an evident and a very close connexion between the nutritive character of the food, and the thriving condition of the animals.

An account of these experiments was published under the superintendence of Mr. Sinclair, the head-gardener of the Duke, but it is now a very scarce and expensive work. Sir Humphry Davy, in his excellent work on Agricultural Chemistry, has given a general view of the result of the experiments; and the reader will probably not be displeased at being put in possession of that which relates to the feeding of sheep. The grasses shall be mentioned in the order of their flowering.

The Sweet-scented Vernal Grass (*Anthoxanthum odoratum*) is found on almost every kind of soil, and is a true permanent pasture grass for general purposes, and for early appearance; but it is not liked by sheep, who will scarcely touch it if there are any white clover or meadow foxtail.

Meadow Foxtail Grass (*Alopecurus pratensis*).—This flowers about May 20, and the seeds are ripened about June 24. On a clayey loamy soil, at the time of flowering, it produces about 20,418 lbs. per acre, every half pound yielding $1\frac{1}{4}$ drachm of nutritive matter. When the seed is ripe the produce would weigh 13,000 lbs. only, but yielding $2\frac{1}{4}$ drachms of nutriment.

The aftermath produces about 8000 lbs., and the proportion of nutritive matter is 2 drachms to the half pound. So that, although there is a greater weight of produce at the early mowing than at the seed time, the real value in nutritive matter is not more than 2 to 3. Sheep are fond of the grass; horses do not dislike it, but oxen do not care for it.

Smooth-stalked Meadow Grass—(*Poa pratensis*) is eaten by sheep, but they prefer most of the fescues. It is an early grass, but it exhausts the soil.

Short Blue Meadow Grass (*Poa cærulea*).—Common in the drier parts of peaty meadows; nutritious, but not sufficiently so to make up for its unproductiveness. Sheep eat it.

Rough-stalked Meadow Grass (*Poa trivialis*).—In rich moist soils, and sheltered situations, it is a highly valuable grass; but on high and exposed ground its produce is inconsiderable; it yearly diminishes, and dies away in four or five years. It is highly nutritive, and sheep are exceedingly fond of it. It flowers about June 13, and the seeds are ripe about July 10. In flowering time its produce per acre is about 7500 lbs. and the proportion of nutritive matter is 2 drachms: at seed time the produce is more than 7800 lbs, and the nutritive matter increased to $2\frac{3}{4}$ drachms. Its superior value at seed-time is therefore very striking, and should not be forgotten. Contrary to what is the case with many other grasses, the straws at the time of flowering are weak and tender; but as they advance towards the period of ripening the seed they become firm and succulent.

Sheep's Fescue (*Festuca ovina*).—Flowers about June 24, and the seeds ripen about July 10. The produce is comparatively small, and the proportion of nutriment is not more than $1\frac{1}{2}$ drachm; but the sheep are exceedingly fond of it. Linnæus affirms that sheep have no relish for hills and heaths that are destitute of this grass. Gmelin, in his 'Flora Siberica,' says that the Tartars fix their summer residence where this grass is in greatest plenty, on account of its being so wholesome for their sheep. It has a very soft and fine foliage, and therefore may be better adapted to the teeth of the sheep than larger grasses; or it may be possessed of some peculiar sanatory power. Sheep are exceedingly fond of it, and they thrive wherever it is found.

Round-headed Cock's Foot Grass (*Dactylis glomerata*).—This is an exceedingly productive and nutritive grass; affording in the flowering time $2\frac{1}{2}$, and when the seeds are ripe $3\frac{1}{2}$ drachms of nutritive matter. The leaves of the aftermath are very succulent. It is valuable for permanent pasture. Sheep eat it very readily.

Welsh Fescue (*Festuca Cambrica*).—The sheep are as fond of it as of the common sheep's fescue, while it is more productive and succulent. It is most valuable when the seeds are ripe.

Narrow-leaved Meadow Grass (*Poa angustifolia*).—Flowers at the end of June; and the seed perfect at the end of July. On account of its early and rapid growth it is very valuable for permanent pasture, and sheep like it.

Hard Fescue (*Festuca duriuscula*).—This grass is most prevalent on light rich soils, but is always found in the best natural pastures, where the soil is retentive. It is one of the best of the finer or dwarf-growing grasses; and most valuable for the feeding of sheep. It flowers about the very beginning of July, and the seeds are ripe towards the latter end of the same month. At the time of flowering it is a very productive grass, as a short one, yielding nearly a ton per acre, and affording a proportion of $3\frac{1}{2}$ drachms of nutritive matter. At seed time the general weight of the grass is somewhat more, but the nutritive matter amounts to only $1\frac{1}{2}$ drachms. The proportionate value of the grass at the time of flowering is therefore 7 to 3.

Meadow Fescue Grass (*Festuca pratensis*).—It constitutes a very considerable portion of the herbage of all rich natural pastures. It makes excellent hay, and never forms rank tufts. It is much liked by cattle, but sheep comparatively neglect it. It flowers at the very beginning of July, and the seed is ripe towards the latter end of the month. Its produce at flowering time is nearly three quarters of a ton per acre, and the quantity of nutritive matter is no less than 4½ drachms. When the seed is ripe the produce is nearly a ton, but the quantity of nutritive matter is only 1½ drachms in the same weight of produce; although not so much in quantity, is three times as valuable at the beginning as at the end of July.

Rye Grass (*Lolium perenne*).—Mr. Sinclair says of this grass:—"Sheep eat it, when it is in the earliest stage of its growth, in preference to most others; but after the seed approaches towards perfection they leave it for almost any other kind. A field in the park at Woburn was laid down in two equal parts, one part with rye grass and white clover, and the other part with cock's foot and red clover. From the spring until midsummer the sheep kept almost constantly on the rye grass, but after that time they left it and adhered with equal constancy to the cock's foot during the remainder of the season." This grass is of almost equal value at the flowering and seed season—the beginning and latter end of July. It may, however, be objected to it, that it exhausts the soil.

Crested Dog-tail Grass (*Cynosurus cristatus*).—Mr. Sinclair says, that the South-down sheep appear to be remarkably fond of this grass, preferring it to most of those that have been described, while, on the contrary, the Welsh sheep comparatively reject it, and browse on almost everything else. The grazier in particular districts may, perhaps, take advantage of this.

Fertile Meadow Grass (*Poa fertilis*).—In early growth, the proportion of nutritive matter, and the nutritive quality of the latter math, this grass will yield to few. It continues to send forth a succession of flowering culms until the frost arrests their growth. It is therefore an excellent meadow grass combined with others.

Yellow Oat Grass (*Avena flavescens*).—Found in dry soils and meadows, and readily eaten by sheep. A calcareous manure renders it considerably more productive.

Meadow Cat's-tail Grass—Timothy Grass—(*Phleum pratense*).—It flowers in the third week in June, and the seed ripens in the end of July. Of much value, for permanent pasture, mixed with other grasses, on account of its early herbage, its great productiveness, and the superior proportion of nutritive matter which it contains. At the seed time, a little before which it should be cut, for if it is cut later the aftermath will be deficient, it contains no less than 5¾ drachms of nutritive matter. It is most useful for the sheep in the form of hay.

Bents (*Agrostis*).—The different species of bent, although common on almost all poor kinds of pasture, possess no great value. Some of the mountain sheep, however, are fond of them. Mr. Sinclair says that the Welsh sheep will leave all other kinds of pasture in order to graze on the common bent.

The improved system of husbandry, and the extent to which the early fattening of the sheep is carried, have rendered various kinds of artificial feeding necessary. Almost the last vegetable that was introduced, and the most important, is the Turnip. While it supplies a great quantity of most useful food for the sheep, it increases the fertility of the soil in the least troublesome and expensive way. The kind of turnip cultivated must depend on the soil. The common or white field turnip will be preferred

on light and sandy soils—the Swedish for the heavier ones. The Swedish turnips are the densest, and least liable to rot; they also are the most nutritive. Half a pound of the Swedish turnip yields 110 grains of nutritive matter; the same quantity of the garden turnip, which is second in the order of nutrition, contains only 85 grains. The quantity of nutrition singularly varies with the size of the root in different species of the turnip. The larger roots of the Swedes afford a greater proportion of nutriment than the smaller ones. In the other varieties the moderately-sized roots have the greatest quantity of nutritive matter.

The frequent and the most economical way of using the turnip is to have two different flocks of sheep succeeding to each other—the fattening and the store sheep. The former are first turned on a portion of the field separated by hurdles; and the power of selection which they have, and of scooping out the roots that please them best, will twice as rapidly add to their condition than if the turnips had been dug up and carted to them on another pasture. The store sheep will follow, and clear everything away.

Due caution has been given under the article "Hoove," p. 429, not to suffer the sheep to remain too long at first on this highly nutritious food. The means to be adopted, should the rumen become over distended, have also been there described.

The turnip crop is liable to very considerable irregularity of produce from various causes, and the farmer is occasionally distressed to find food for his sheep. This has led some to have recourse to the Potatoe, and with very great success. The quantity of nutritive matter in a given weight of the roots is doubled, and sometimes trebled, in the potatoe. In the ox noble 235 grains are yielded by every half pound of the root; the rough red yields 305 grains, and the champion not less than 378 grains.

The Rye Grass has been already mentioned as an occasional food for sheep. The Red Clover is another favourite food, the spring leaves of it yielding a very considerable quantity of nutritive matter. The red clover is far more nutritive than the white or Dutch clover. Lucern yields still more, and Burnet yet more nutritive matter.

The Mangel Wurzel has lately been tried. The weight of crop produced on a suitable soil has caused this root to be ranked among the profitable ones, but like all other nutritious roots, it sadly deteriorates the soil. A writer in the "Farmer's Journal" says, that from his turnip-crop failing in 1820, he fed his ewes with mangel wurzel and hay—25 lbs. of the former and 5 lbs. of the latter. From the great quantity of milk which the ewes yielded the lambs were in high condition. Some other sheep of his increased on the average 8 lbs. per quarter in five weeks. Each had 25 lbs. of mangel wurzel, and 5 lbs. of good hay daily *.

Another writer in the same periodical states, that he fed his ewes on mangel wurzel. Some of them fed voraciously, and in a short time sickened, and began to lose their wool, a great part of it coming off in flakes, and leaving the skin naked. He therefore recommends to give only a small quantity to the ewes at the time of lambing, increasing it as the lambs increase in size; for, he very properly adds, "to create by any succulent food the greatest possible flow of milk in the ewe when the lamb is young and not able to draw the whole quantity, is a bad practice †."

Potatoes have, as already observed, occasionally been adopted as a winter food, either when the turnip crops failed, or alternately with them, in order that they might last through the winter. They are given sliced in

* Farmer's Journal, December, 1821. † Ibid., January, 1822.

the cribs or troughs; and when there is convenience for steaming them, few things so rapidly fatten the sheep.

When describing the management of the Southdown and the Leicester sheep, a sufficient account was given of both the summer and the winter feeding of these breeds, and to this the reader is referred. Peas and barley-meal, and oil-cake, and, most of all, corn in a ground or green state, are had recourse to, as the convenience or the prejudices of the owner suggest.

The number of sheep and lambs sold in Smithfield and Islington Markets during the year 1836 was 1,336,319; the average number in the preceding five years was 1,369,229. This decrease arose from the rapidly increasing supply of ready-slaughtered meat by means of the steamers from the whole extent of the northern coast and from Scotland.

In the first quarter of the year, and until the grass-fattened sheep are out of their wool, the sheep and lambs are supplied from the midland and western counties, from the northern so far as Norfolk, and by the sheep-feeders near London.

Towards the spring, sheep begin to come from the northern districts, and especially from Northamptonshire and the counties of Leicester and Lincoln. The Kentish and Kentish half-breeds increase, and the Scotch and Welsh fattened in England. The lambs are from various parts, but particularly from Berkshire, Surrey, and West Sussex.

As the spring advances the mutton of the northern districts is in its greatest perfection; yet full half of the sheep and the greater part of the lambs come from the south and west, and there is a large quantity of slaughtered meat.

In June the shorn sheep, and especially from Lincoln and Leicester, claim notice, but the Southdowns are also in high condition. The supply from the extreme north is now at its height.

As the autumn approaches, the Leicesters, the South Downs, the Kents, and the different west country breeds prevail—the Norfolks beginning to increase in number, and lamb to get out of season. The Norfolks become more numerous, and so do the west country sheep, and comparatively few arrive from the north, except much slaughtered meat by means of the coast steamers; and, towards winter, the Norfolks have decreased, and the supply from the marshes in the neighbourhood of the metropolis is more abundant; lamb is scarcely seen, but much slaughtered meat arrives from the coast.

Chapter XIX.

A LIST OF THE MEDICINES USED IN THE TREATMENT OF THE DISEASES OF SHEEP.

Alcohol (*Spirit of Wine*).—In the sheep as well as in cattle, every kind of fever and every kind of inflammation is apt to take on a typhoid or malignant form, and therefore we are accustomed, even while we are combating inflammation, to add a stimulant to our purgative. The cuticular coat of the rumen into which the greater part of the medicine too often finds its way, renders it necessary to add some stimulant sufficiently to rouse this stomach to the discharge of its contents; therefore ale, gin, tincture of gentian, &c., are, in small quantities, added to the other ingredients, if the evident existence of inflammation or fever does not forbid it.

Aloes, as a purgative, is very uncertain in the sheep, and sometimes

dangerous. It has been given in doses of one ounce and a-half without producing the slightest effect. Two ounces have destroyed the sheep, not by superpurgation, but by direct inflammation. The tincture of aloes, however, is a very useful, stimulating, and healing application to wounds. Two ounces of powdered aloes, and a quarter of an ounce of powdered myrrh, should be macerated in a pint of rectified spirit, diluted with an equal quantity of water. This will be found particularly useful in foot-rot when the caustic has eaten away the fungus, and the chloride of lime has removed the tendency to mortification.

Alteratives.—The old alterative powder for horses and cattle will be very useful in the cutaneous diseases of sheep. It is composed of Æthiop's mineral, nitre, and sulphur, in the proportions of one, two, and four—about two drachms being the average dose, and to be given daily until the disease is cured.

Alum is sometimes used as an astringent in the diarrhœa of lambs, but it is far inferior to the "Sheep Cordial."

Antimony.—One preparation of it alone is in any considerable repute, the chloride, or butyr, in cases of foot-rot, as described under the treatment of that disease.

Arsenic is used as a wash for sheep with scab, as described in the proper place. It is far from being an effectual application, on account of the difficulty of getting it fairly to penetrate through the wool; and when it does so penetrate, it becomes to a certain extent poisonous.

Calamine.—See Zinc.

Camphor.—Used externally in the form of oil for strains and swellings of the joints.

Catechu.—An extract from the wood of one of the Acacia trees: an excellent astringent. It is one of the ingredients in the "Sheep's and Calves' Cordial," as described at p. 469.

Chalk.—A valuable antiacid, and also an ingredient in the "Sheep's Cordial."

Corrosive Sublimate.—See Mercury.

Digitalis (*Fox Glove*).—A valuable sedative, and entering into almost every fever medicine.

Epsom Salts.—The very best purgative that can be administered to sheep, and in fact almost superseding every other. The dose from half an ounce to an ounce.

Gentian.—The best vegetable tonic, and also superseding every other. Dose, from one to two drachms.

Ginger.—An excellent stomachic and tonic, and forming an ingredient in almost every aperient drink. Dose, from half a drachm to a drachm.

Iodine.—Often used with good effect, in the form of ointment, to disperse indurated tumours, and particularly in the udder. The preparation of iodine thus used is the hydriodate of potash, in the proportion of one drachm of the compound to seven drachms of lard.

Lead.—The only preparation of lead that is much used in sheep practice, is the subcarbonate or the common white lead, in order to destroy the maggots of the fly. It is superseded by the spirit of tar.

Lime.—The chloride of lime has great value as a disinfectant, and is given in small quantities to get rid of the gas in cases of hoove.

Linseed Oil.—Used occasionally as a purgative when the Epsom salts will not act, or when great intestinal irritation is expected. Dose, from two to three ounces.

Mercury.—The mercurial ointment when rubbed down with from five to seven parts of lard, a safe and almost certain cure for the scab.

Calomel (the protochloride of mercury).—Seldom used in sheep practice.

Corrosive Sublimate (the bichloride of mercury).—A solution of it is often employed as a wash for scab; but it is liable to the same objection as the arsenic; there is no certainty of its penetrating through the wool, and if it does penetrate it is a dangerous application.

Myrrh.—A valuable addition to the tincture of aloes, as an application to wounds.

Nitrate of Silver.—An invaluable caustic for wounds inflicted by a mad-dog, or infected by any kind of poison.

Nitre.—An ingredient in the usual fever medicine. The dose rarely exceeding a drachm.

Opium.—An ingredient in the "Sheep's and Calves' Cordial." A cholic drink would have little effect without it; and if opium were omitted in the medicines for diarrhœa and dysentery, every other drug would be given in vain.

Salt.—The chloride of sodium, or common kitchen salt, has an excellent effect in promoting the condition of the animal, when occasionally sprinkled over its food, or placed within its each. It is the basis of every medicine that has yet been produced which really has power over the rot, and in the early stage of that disease it has often completely arrested its fatal progress.

Sulphur is a very good aperient, in doses of from one to two ounces. It is more valuable, however, as keeping the bowels in a relaxed state when they have been opened by other medicines. Sulphur is the basis of every ointment for the cure of mange, and is useful in the common scab. It enters also into the composition of the best alterative powders.

Tar is used with butter for salving the sheep in cold and exposed situations. It is also sometimes used for marking sheep, and is a very useful dressing in foot-rot.

Spirit of Tar.—A useful application to the feet in foot-rot. It also has great effect when applied to the parts that have been struck by the fly. It destroys the maggots already formed, and no fly will deposit her eggs where this liquid has been used.

Oil and Spirit of Turpentine.—These are often very useful applications to wounds, and especially those of long standing. They also prevent the attack of the fly. Common turpentine is added to milder ointments, in order to make them somewhat stimulating, and giving them a digestive character.

Zinc.—The carbonate of it is mixed with lard, in the proportion of one drachm to seven, and makes a very excellent emollient and healing ointment.


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