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BOOKS IN NATURAL HISTORY.

HISTORY
OF

THE MAMMALIA.

VOLS. V. & VI.

ORDER—RUMINANTIA.

NUMEROUS ILLUSTRATIONS.

SIX VOLUMES.

LONDON:

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BOOK NO.

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22

th ² Paseng	239
ar ^e Aoudad	242

GENUS OVIS.

TEP	244
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GENUS BOS.

he Ox	279
he Wild White Cattle of Chillingham Park	289
nglish Domestic Cattle	293
he Zebu	347
Gayâl	364
Gyall	367
our	370
Ya	373
Anoa	375
Arlee, or Urna	377
Common Buffalo	377
Cape Buffalo	396
Aurochs, or Zubu	402
merican Bison	408
Musk-Ox	413



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 organs
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LIST OF ILLUSTRATIONS.

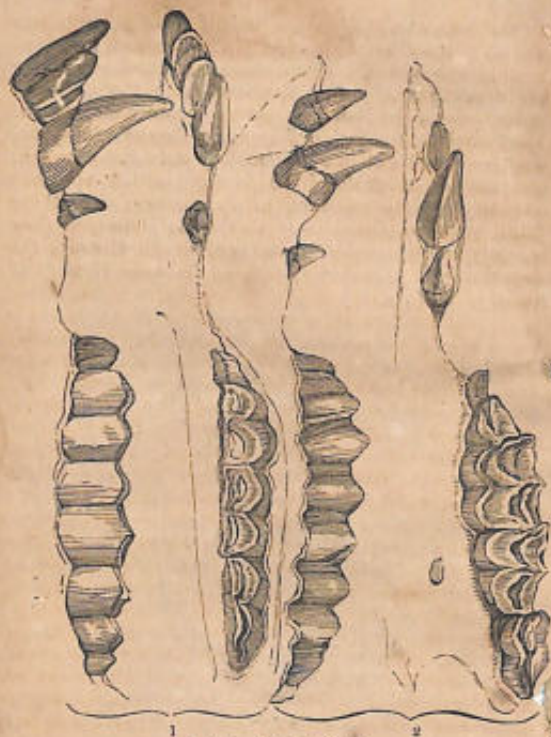
	Page		Page
Teeth of Camel	7	Vicugna	77
Foot of Camel	8	Head of Giraffe	77
Pad of Camel	9	Mode of procuring Food	77
Camel's Stomach	12	Ditto	77
Camel	13	Back view of Giraffe's Head	83
Swift Camel	14	Skull of Giraffe	84
Caravan in the Desert	15	Giraffe about to lie down	85
Loading the Camel	16	Giraffe	85
Head of Camel, with Bells	18	Ditto	85
Halt of Camels	19	Dentition of Moschidae	85
Ditto	20	Skeleton of Musk-deer	85
Camels fighting	22	Skeleton of Meminna	85
Camel uttering its cry	23	Musk-Deer	85
Mounted Camels	24	Meminna	85
Swift Camel	26	Napu	85
Oriental Pilgrimage	28	Kanchil	85
Mounted Camels	29	Horns of Stag	85
Camels watering	31	Horns of Wapiti	85
Camel and Horse	32	Horns of Fallow-Deer	85
Camels watering	35	Ditto	85
Camel carrying a Bride	48	American Elk	85
Swift Camel, mounted	49	Horns of Moose-Deer	85
Malefactor paraded on Camel	50	Moose-Deer	85
Attack by Arab Robbers	52	Feet of Rein-Deer	85
Bedouin Encampment	54	Rein-Deer	85
Bactrian Camel	55	Cestras arandi	85
Ditto	56	Rein-Deer and Lapland	85
Foot of Llama	57	White Rein-Deer	85
Tame Llama (white)	59	Rein-Deer harnessed	85
Guanaco	62	Horns of Caribou	85
Male Brown Wild Llama, or		Ditto	85
Guanaco	63	Fallow-Deer	85
Guanaco	66	Fallow-Deer	85
White Llama	70	Horns of W	85
Paco	72	Red-Deer	85

They measure two inches and a half in length. There are no canines in the lower jaw. Incisors eight, as usual; none above. The existence of canine teeth in the upper jaw of the males, though not a universal feature among the Ruminants, is by no means uncommon. They occur in the males of many of the deer tribe, and we have seen them in a rudimentary state and buried in the gum in the female of the South American species; and they have been found in one species of antelope (*Ant. montana*, Rüpp.)—in this animal, however, they are only half-developed germs, becoming lost before the animal attains to maturity. (See 'Proceeds. Zoological Society,' 1836, p. 3.)



Fig. 3.

As the dentition of the Ruminants is so constant and unvarying in its general characters, so is the structure of the organs of progression; and where, as in the *Camel*, we find a variation in the former, so do we also find a corresponding variation in the latter. On looking at the foot of a Ruminant, the first thing we observe is, it is hooved and cloven; an anatomy shows us



1 and 2.—Teeth of Camel.

four molars on each side below, and five above, there being no detached canine-like molars. The Chevrotins (*Moschidae*) are remarkable for the development of canines of the upper jaw in the male; they are posteriorly recurved, compressed, with a posterior sharp edge, and project downwards out of the mouth. In the



148.



149.

144.



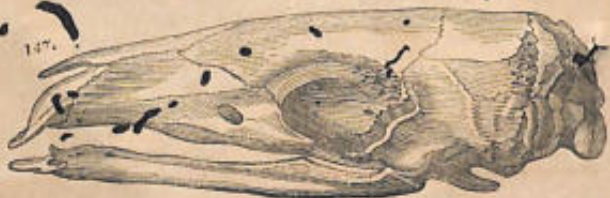
145.



146.



147.



LIST OF ILLUSTRATIONS.

	Page		Page
Elastic Pads of foot of Felidae	7	Ocelot	71
Dentition	8	Ditto	72
Ditto	9	Cacti	74
Ditto	10	Pampas Cat	76
Skull of Felidae	11	Caracal	79
Toe from the left foot of a young		Ditto	81
Lion	12	Rooted Lynx	82
Toe from the hind-foot of a		Chaus	84
young Lion	13	European Lynx	87
Illustration of the foregoing		Canada Lynx	87
mechanism	14	Teeth of Bear	91
Skeleton of the Lion	15	Skeleton of Polar Bear	92
Papillæ on the Lion's tongue	17	Brown Bear	94
Ditto,—magnified view	17	Bear with dead Horse	96
African Lion (Barbary)	18	Brown Bear	97
Cape Lions	19	Siberian Bear	99
Bengal Lion, with Lioness	20	Siberian Bears	100
Persian Lion	21	American Black Bear	101
Maneless Lion of Guzerat	22	Ditto	102
Crippled Lion	23	Ditto	103
Prickle in tail of Lion	25	Spectacled Bear	104
Lion-Tiger Cubs	26	Grisly Bear	105
Royal Tiger	27	Ditto	106
Leopard-catching	28	Bear and Dogs	109
Leopard	29	Syrian Bear	111
Black Panther	30	Thibet Bear	112
Leopard (Senegal)	31	Malayan Bear	114
Ounce	32	Bornean Bear	115
Rimaa-Dahan	33	Sloth-Bear	117
Nepaul Tiger-cat	34	Pola Bear	119
Serval	35	Ditto	121
Cheetah	36	Pretended Hybrid of Bear and	
Ditto	37	Dog	123
Wild Cat	38	Tooth of Machairodus; ditto of	
Tail of domestic Cat, and tail of		Megalosaurus	125
wild Cat	39	Raccoon	127
Egyptian Cat	40	Ditto	128
Jaguar	41	Teeth of Panda	132
Puma	42	Feet of Panda	133
Ditto	43	Panda	134
Ditto	44	Rufous Coat	137

	Page		Page
Teeth of Kinkajou	139	Squirrel Petaurus	191
Kinkajou	141	Koala	192
Teeth of Virginian Opossum	145	Teeth of Wombat	193
Skeleton of Virginian Opossum	147	Wombat	194
Virginian Opossum	149	Echidna	195
Merian's Opossum	151	Skull of Echidna	196
The Yapoek	153	Teeth of Ornithorhynchus	200
Brush-tailed Phascogale	155	Skeleton of Ornithorhynchus	200
Teeth of the Ussine Opossum	156	Magnified Hind-foot of Female Ornithorhynchus	200
Head of Ussine Opossum	157	Ornithorhynchus	201
Ussine Opossum	157	Burrow of Ornithorhynchus	206
Ditto	159	Smaller young specimen of Ornithorhynchus, and front view of the mandibles	207
Dog-headed Thylacinus	161	Larger young specimen of Ornithorhynchus	208
Teeth of Long-nosed Bandicoot	163	Magnified view of the mammae and areola	209
Long-nosed Bandicoot	164	Mammary gland of Ornithorhynchus, reduced below the natural size	210
Ditto	165	Portion of integument from the abdomen of Ornithorhynchus	211
Cherop	168	Ornithorhynchus combing itself	212
Skull and Lower Jaw of Banded Myrmecobius	169	Ornithorhynchus sleeping	213
Banded Myrmecobius	170	Skull of Ornithorhynchus	214
Skeleton of the Kangaroo	172	Lower jaw of Ornithorhynchus, seen from below	215
Skull of Great Kangaroo	174	Sternal apparatus of Ornithorhynchus	216
Great Kangaroos	176	Jaw of Thylacotherium	217
Great Kangaroo	179	Jaw of Phascolotherium	217
Outline of young Kangaroo, Head of Fœtus, and Teat of Mother	180		
Teeth and Skull of Kangaroo Rat	182		
Kangaroo Rat	183		
Teeth of Sooty Tapca	185		
Vulpine Phalanger	188		
Spotted Couscous	189		
Teeth of Squirrel Petaurus	191		

SKETCH

OF THE

HISTORY OF THE MAMMALIA.

In previous volumes we have given a full account of 'The Elephant,' 'The Horse,' and 'The Dog;' the importance of these animals in the service of man, and the interest attached to the account of them, justified, as we thought, the devotion of a volume to each. To the 'History of the Monkey Tribe' we have also given a volume; and we now propose, in as short a compass as possible, to complete a 'Sketch of the History of the Mammalia.' Though we shall treat each family distinctly, the plan of arrangement into volumes will not allow of our preserving the scientific order, and we therefore give the following summary, which may not be devoid of utility. Our volumes, however, will not, of course, treat of the first order of the class—Man.

Class MAMMALIA.

A. Subclass *Placentalia*.

Orders.

1. Bimana :—Man.
2. Quadrumana :—Apes, Monkeys, Lemurs.
3. Cheiroptera :—Bats.
4. Carnivora :—divided into
 - Felidæ :—Cat tribe.
 - Mustelidæ :—Weasel tribe, Otters, &c.
 - Viverridæ :—Viverrine tribe, Civet, Genet, Ichneumons.

Orders.

4. Carnivora—*continued*.

Hyænidæ :—Hyænas.

Canidæ :—Dog tribe.

Ursidæ :—Bear tribe.

Phocidæ :—Seals.

5. Insectivora :—Shrews, Moles, Hedgehogs.

6. Cetacea :—Whales, Grampus, Porpoise.

7. Pachydermata :—

Terrestrial :—Elephant, Rhinoceros.

Aquatic :—Dugong, Manatee, &c.

8. Ruminantia :—Oxen, Deer, Antelopes, Sheep.

9. Rodentia :—Hares, Rats, Porcupines, &c.

10. Edentata :—Sloth, Armadillo, Manis, Ant-eater.

B. Subclass *Implacentalia* (Marsupialia, Auct.).

11. Marsupialia :—Kangaroo, Opossum, Wombat.

12. Monotremata :—Ornithorhynchus, Echidna.

ORDER.—CARNIVORA.

FAMILY.—FELIDÆ.

In this family group, which scarcely admits of any generic subdivisions, are comprehended the most sanguinary, the most formidable, and the most typical of the order Carnivora. That is to say, in these animals the organs of destruction exhibit the highest degree of development. Among quadrupeds they are what the eagles and falcons are among birds.

Essentially carnivorous, still, unlike the dog, which relishes carrion, they reject putrescent flesh, and consequently are more expressly endowed and fitted for the work of wholesale slaughter. Their instincts are powerful, are, in fact, in admirable accordance. Their frame is vigorous, but agile,—their limbs are short, the joint well-knit, but supple, and every motion is easy, free and graceful. They leap and bound with astonishi

XIII a 1

CONTENTS OF VOL. I.

ORDER—CARNIVORA.

FAMILY—FELIDÆ.

	PAGE
The Lion	18
The Tiger	37
The Leopard, Panther, and Ounce	43
The Rimau-Dahan	50
The Napaul Tiger-Cat	52
The Serval	53
The Cæcetah	54
The Wild-cat	59
The Egyptian Cat	62
The Jaguar	64
The Puma	66
The Ocelot	70
The Chati	73
The Pampas Cat	76
The Lynx	78
The Caracal	78
The Booted Lynx	81
The Chaus	83
The European Lynx	84
The Canada Lynx	87

FAMILY—URSIDÆ.

The Brown Bear	93
The Siberian Bear	98
The American Black Bear	100
The Spectacled Bear	104
The Grisly or Grizzly Bear	105
The Syrian Bear	110

	PAGE
The Thibet Bear	111
The Malayan Bear	113
The Bornean Bear	115
The Sloth-Bear	116
The Polar Bear	119
A pretended Hybrid between a Dog and a Bear	122
The Racoon	126
The Panda	134
The Brown Coati	135
The Rufous Coati	137
The Kinkajou	138

ORDER—MARSUPIALIA.

The Virginian Opossum	144
Merian's Opossum	151
The Yapock	152
The Brush-tailed Phascogale	154
The Dog-head Thylacinus	160
The Long-nosed Bandicoot	162
The Chaeropus	167
The Banded Myrmecobius	169
The Great Kangaroo	171
The Kangaroo at, or Portoroo	181
The Sooty Tapoa	184
The Vulpine Phalanger	188
The Spotted Couscous	189
The Squirrel Petaurus	190
The Koala	193
The Wombat	195
The Echidna, or Porcupine Anteater	199
The Ornithorhynchus, or Water-Mole of the Colonists	202
Fossil Marsupials	217

velocity. Their footfall is silent, the feet being provided with elastic pads, namely, a large basal ball or cushion, and one under each toe. (Fig. 1.) The claws are of



Fig. 1.

enormous size, hooked, and sharp, and when not in use completely retracted within a sheath, so as not to be visible. These, indeed, and the teeth, are the instruments of their destructive energy.

The dentition of the Felidæ is very characteristic. The incisors are very small, six above and six below. The canines are of enormous size and strength; the false molars are sharp and compressed; above there are two on each side,—the first small, the second long and conical. This is followed by the laniary molar (carnassière), which is bicuspid with an inner blunt tubercle; behind the laniary is a very minute tuberculous molar, but this is wanting in the lower jaw, and the laniary is bicuspid.

Dental formula.—(Figures 2, 3, 4.)

Incisors	$\frac{6}{6}$	canines	$\frac{1-1}{1-1}$	molars	$\frac{4-4}{3-3}$
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The shortness of the muzzle and the boldness of the *Schæp*ital ridge give an appearance to the skulls of the Felidæ as if they were drawn out backwards; the forehead has no sudden rise, but is continued from the nasal bones to the occiput in a gradual arch. The union of the interparietal and occipital ridges forms a beetling promontory (to which is attached the ligamentum nuchæ), overhanging the occipital bone, which has a



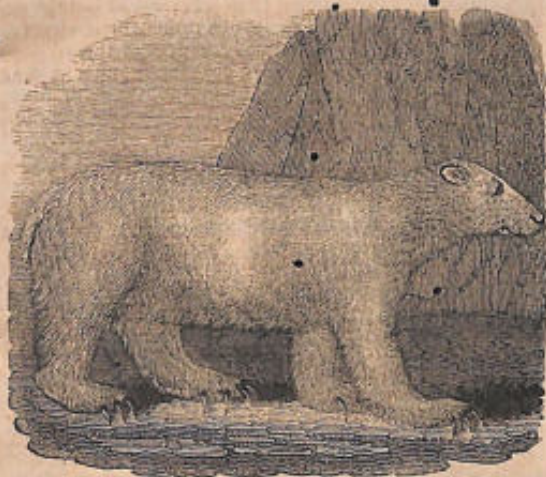
Fig. 2.



Fig. 3.



Fig. 4.



70.—Polar Bear.

It is stated on the best authorities, that the male does not hybernate, but that the female, on the approach of the severer season, retires to some rift among the rocks or ice, or digs a lair in the frozen snow; the falling snow drifts over the den, covering it to a great depth, a small aperture for breathing being always open. In this retreat about the latter part of December she brings forth two cubs, and in March quits the den with them, then about as large as a shepherd's dog, and prowls abroad, lean, gaunt, and ferocious; hunger and the presence of her offspring adding fury to her savage temper.

The male wanders about the marshes and adjacent parts until November; he then goes out to sea upon the ice in quest of seals, and becomes very fat. It often happens that he becomes drifted out from the coast on a floating field of ice; and in this way, says Dr. Richardson,

polar bears are often carried from the coast of Greenland to Iceland, where they commit such ravages on the flocks, that the inhabitants rise in a body to destroy them.

Of the devotion of the female polar bear to her young, and of the danger attendant upon the chase of these animals, many travellers have made mention, and recorded various facts which came under their own observation. These, however, are so "popularly current, that it is sufficient to allude to them.

It was not until Linnæus published the tenth edition of his '*Systema Naturæ*,' that he had any idea that the polar bear was distinct from the brown bear, the only species he appears to have known. Martens, however, had previously distinguished it, and indeed was the first to characterize it from actual observation ('*Spitzbergische oder Grönländische Reisebeschreibung*,' Hamb., 1675).

This species is of a more lengthened form than that of the others; the head is very much elongated and flattened, the ears and mouth comparatively small, the neck very long and thick, and the sole of the foot very large. The fur is silvery white, tinged with yellow; close, short, and even, on the head, neck, and upper part of the back; long, fine, and inclined to be woolly on the hinder parts, legs, and belly. The sole of the foot is almost entirely covered with long hair affording the animal a firm footing on the ice. The claws are black, not much curved, thick, and short. Captain Lyon's crew found none of the terrible effects (skin peeling off, &c.) from eating the flesh, ascribed to it by some of the earlier voyagers.

A PRETENDED HYBRID BETWEEN A DOG AND A BEAR.

From time to time supposed hybrids of this sort have been exhibited, and there is generally an inclination to believe in the existence of creatures the offspring of such a parentage. That two animals so different in structure, dentition, general habits and instincts as the dog and bear

should breed together is improbable—nay, contrary to the laws of nature and to physiology. We are not, however, surprised that at a time when a belief in monsters, both of the human and brute creation, was almost universal, that men of education should have credited the existence of a dog-bear.

Our figure (Fig. 71) is copied from a curious work, entitled '*Histoires Prodigeuses extraictes de plusieurs fameux Autheurs, Grecs et Latins, sacrez et profanes, divisées en cinq tomes, le premier par P. Boaistuan.* Tome Premier, Paris, 1582.' It would appear that M.



71.—Pretended Hybrid of Bear and Dog.

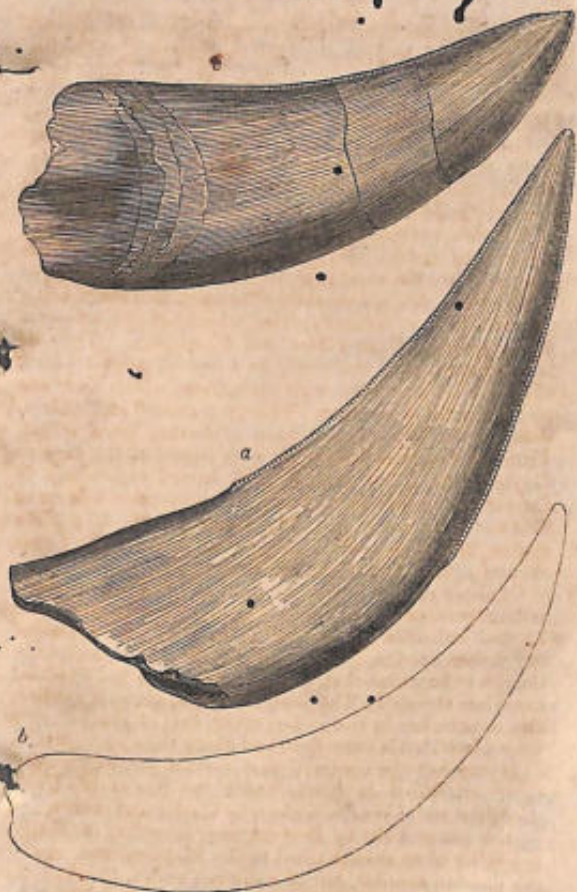
Pierre Boaistuan, who visited England in the reign of Elizabeth, and was introduced to the court, was shown two dogs, asserted to be of the parentage in question, both of which were presented to M. le Marquis de Trans: one this nobleman gave to M. le Comte d'Alphestan; the other, of which the figure is given by M. Boaistuan, he took to France. He describes the beast as extremely ferocious, and in form intermediate between the dog and bear, the latter being its male parent. There can be but little doubt that the bearwards palmed off these animals upon him and others as hybrids, but which were really

dogs selected for their bear-like appearance—an appearance increased by cropping the ears and tail, and other skilful artifices.

The genus *Ursus* is rich in the reliquiae of extinct species. These occur for the most part in various caverns in Germany, Hungary, and England, along with the bones of other Carnivora, as the wolf, hyæna, tiger, glutton, &c., and also of herbivorous animals, though these are less in number. In most of these caves (that of Kirkdale excepted, where the remains are principally those of an extinct species of hyæna) the bones of the bear tribe are the most prevalent. In the vast cavern of Gaylenreuth this is remarkably the case, the bones being referable to three distinct species, which have been termed *Ursus priscus*, *U. arctoides*, and *U. spelæus*. They lie for the most part confusedly in a bed of animal earth, and are often encrusted with stalagmite, which lines the roof and walls of the cave. Though scattered and broken, these bones exhibit no tokens of having been rolled. Professor Goldfuss states that with regard to the cave of Gaylenreuth, if we assume 1000 buried individuals of the various species found there, the proportion will be as follows:—*Hyæna spelæa*, 25; *Canis spelæus*, 50; *Felis spelæa*, 25; *Gulo spelæus*, 30; *Ursus priscus*, 10; *Ursus arctoides*, 60; *Ursus spelæus*, 800.

Of these extinct bears, the skull of the *Ursus spelæus* is distinguished by the bold elevation of the forehead, and its size indicates the animal to have greatly exceeded any living species. The skull of the *Ursus arctoides*, though as large as that of *U. spelæus*, has the forehead much less elevated. The skull of *Ursus priscus* is smaller, and approaches in size and contour that of the common brown bear, but is more flattened along the upper surface.

It may here be observed that certain serrated canine teeth attributed to bears, under the names of *Urs*, *Etruscus* and *Ursus cultridens*, by Cuvier and others, and to the genus *Felis* by Bravard, are, according to Kaup, the relics of an animal allied to the Megalosaurus, one of the Saurian reptiles, but of a distinct genus, to which he has given the name of *Machairodus*. In Fig. 72, *a* is a



72.—a, Tooth of Machairodus; b, Outline of a cast of the perfect Tooth; c, Tooth of Megalosaurus.

tooth of *Machairodus*, natural size, imperfect below; *b*, the outline of a cast of the perfect tooth; *c*, a tooth of *Megalosaurus*, natural size. Professor Owen, however, regards the teeth (*a*, *c*) as having belonged to a mammiferous animal, not however a bear; and the proof is afforded by the cast (*b*), which shows that the tooth was originally lodged in a socket, and not ankylosed to the substance of the jaw, and that the fang is contracted and solidified by the progressive diminution of a temporary formative pulp, and does not terminate in an open conical cavity, like the teeth of all known Saurians, which are lodged in sockets.

Genus PROCYON.

Dental formula:—Incisors $\frac{6}{6}$; Canines $\frac{1-1}{1-1}$; Molars $\frac{6-6}{6-6} = 40$. The two true molars on each side are equal, or nearly so; and the carnassière nearly resembles the true molars, not being suited to cutting flesh.

THE RACCOON. (*Procyon lotor*.)

Raton of the French; Mapach, Yllamaton, Maxile, and Cioatlamacazque of the Mexicans, according to Hernandez.

Notwithstanding Buffon's assertion to the contrary, the Raccoon inhabits Canada as well as the warmer regions of America; its range being from about 50° north lat., extending through Mexico and the United States, and thence, as it would seem, into South America as far as Paraguay. In size these animals equal a common fox, having a stout body with moderate limbs, and a plantigrade, or rather semi-plantigrade, walk; for, though the sole is naked, it is only when the raccoon rests that it is totally applied to the ground. The toes, five in number, are armed with sharp claws; the muzzle is acute, the nose tapering beyond the lips, and flexible; the eyes are moderate, with a circular pupil; the ears are short, erect,

and rounded; the whiskers long; the tail moderate, and somewhat bushy. General colour brownish gray, the tail being tinged with a blackish tint; muzzle dirty white; a black or dark brown mark across the eyes and cheek, and another between the eyes, extending from the forehead; under parts pale gray. (Fig. 73.)

The racoons are nocturnal in their habits, sleeping out the day in their holes, and prowling at night in search of food. The borders of the sea and the margins of swamps and rivers are their favourite localities; and they prey upon small animals, birds, eggs, and insects, adding roots, fruits, and sweet succulent vegetables to their diet. Nor are crabs, oysters, and other shell-fish, less acceptable, for which they visit the shores at low-water. To the partiality of the racoon for oysters we can ourselves testify; for some years since we repeatedly tried one of



73.—Raccoon.



74.—Raccoon.

these animals with the hard-shelled mollusk in question, which it greedily devoured. Its first action was to crush the hinge of the shell between its teeth: which done, it wrenched the two valves so far asunder as to enable it to scrape out the mollusk with its claws. (Fig. 74.)

In the description of a tame raccoon by M. Blanquet des Salines, we are informed, "It opens oysters with wonderful skill; it is sufficient to break the hinge, its paws complete the work. It must have an excellent sense of touch. In this operation rarely does it avail itself of sight or smell; for instance, it passes the oyster under its hind-paws, then without looking seeks by its hands the weakest place; it there digs in its claws, forces apart the valves, and tears out the fish in fragments,

leaving nothing behind." This was precisely what we ourselves witnessed.

The racoon is asserted to have the habit of dipping its food into water before eating it, whence it has received the appellation of *lotor*, or washer; but although we have had numerous opportunities of observing the animal in captivity, we never saw this mode of proceeding.

Though incapable of grasping objects with its paws, the racoon can hold its food between them pressed together, in doing which it usually sits upon its haunches like a bear, and in this attitude it very often feeds.

Of the senses of this animal, that of smell is the most developed, and is very acute: the eyes, though the pupil is round, are better adapted for twilight or night than for the glare of day; indeed, a strong light distresses and confuses this animal exceedingly. In its natural state, in fact, the racoon is nocturnal, and it is most probably from the circumstance of the eyes being incapable of sustaining daylight, that blindness from cataract (opacity of the lens) is so common in these animals in a state of captivity, when they are liable to be roused up, and are often kept awake during the whole or greater part of the day.

The gait of the racoon on the ground is oblique, and when it moves quickly its mode of progression consists of a series of bounds, reminding us of the lemurs, but with nothing of their grace and lightness. When taken young this animal is easily tamed, becomes playful, and is fond of being noticed and caressed, but is at the same time very capricious and easily offended; and to some persons, without any apparent cause, it will show from the first marked signs of hostility. When enraged or desirous of attacking a person, the racoon advances, as we have often witnessed, with arched back and bristly hairs, and with its chin or under-jaws close to the ground, uttering gruff sounds of displeasure. If once injured, it seldom forgives its enemy.

It greedily attacks poultry within its reach, and is as cunning and destructive as the fox; though, according to M. Blanquart des Salines, it only devours their heads, which agrees with Dr. Richardson's observations.

When roused from its diurnal indolence, the racoon is restless, inquisitive, and prying; it climbs with the greatest skill, in the same manner as a bear, ascending and descending a tree, a pole, or branches fastened in its apartment, with the utmost address. It is apt to become very fat, and its flesh is said to be palatable. The fur is used in the hat-manufacture, and the skins are imported in tolerable numbers.

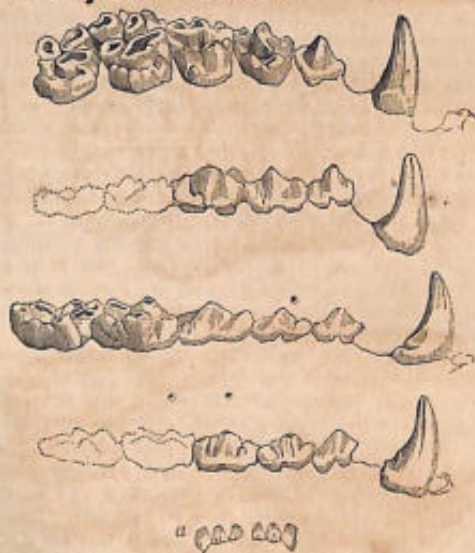
Buffon, in speaking of the localities tenanted by the racoon, says:—"This animal is originally from the southern regions of America: it is not found in the Old World; at least, travellers who have spoken of the animals of Africa and the East Indies make no mention of it. It is, on the contrary, very common in the warm climates of America, and especially in Jamaica, where it inhabits the mountains, whence it descends to feed upon the sugar-canes. It is not found in Canada, nor in the other northern portions of this continent; nevertheless it does not greatly fear the cold; M. Klein brought up one at Danzig, and that which we had has passed a whole night with its feet locked up in the ice without experiencing any ill effects." As respects the racoon not inhabiting Canada, Buffon is most certainly wrong. It is even eaten in Canada, as we are positively informed by a gentleman who has seen it brought to the table. Dr. Richardson informs us that the racoon "inhabits the southern parts of the fur districts, being found as far north as Red River, in lat. 50°, from which quarter about one hundred skins are procured by the Hudson's Bay Company. If there is no mistake as to the identity of this species, the racoon extends farther north on the shores of the Pacific than it does on the eastern side of the Rocky Mountains. Dixon and Portlock obtained cloaks of racoon-skins from the natives of Cook's River in lat. 60° N.; and skins, supposed to be those of racoons, were also seen at Nootka Sound by Captain Cook. Lewis and Clarke expressly state that the racoon at the mouth of the Columbia is the same with the animal so common in the United States." To this Dr. Richardson adds, "its flesh, when fed on vegetables, is reported to be good."

In captivity the racoon exhibits much cunning and a resentful temper. M. Blanquart des Salines, who kept one of these animals, states that a servant had one day struck his racoon a few blows with a whip: "in vain did the man afterwards attempt a reconciliation; neither eggs, nor food most coveted by the animal, availed in pacifying it. At his approach, it enters into a sort of fury; with sparkling eyes it darts at him, and utters loud cries of suffering. Whatever is presented to it at that time it refuses until its enemy has disappeared. Its accents of anger are very singular; sometimes one might fancy them the whistling of the cuckoo, at others the hoarse bark of an old dog. If any one beats it, or if it is attacked by an animal which it thinks stronger than itself, it opposes no resistance; like a hedgehog, it conceals its head and its paws, and forms its body into a ball; no cry escapes it, and in this position it would suffer death." With much caprice there is no little cunning in the character of the racoon, mixed with malice and a fondness for destruction. The writer above quoted informs us that the chain of his racoon is sometimes broken, "and that liberty renders it insolent: it takes possession of a room, and will suffer no one to come near it; it is not without difficulty that it can be refettered. Since it has lived with me, its slavery has frequently been suspended. Without losing sight of it, I often allow it to walk with its chain, and every time a thousand little gambols express to me its gratitude. It is quite the contrary, however, when it escapes itself: it then rambles sometimes for three or four days together over the neighbouring roofs, and descends at night into the courtyards, enters the poultry-roosts, strangles the fowls, and eats their heads, attacking more especially the Guinea fowls. Its chain did not render it more gentle, but only more circumspect; it then employed artifice, and familiarized the poultry with it, permitting them to come and partake of its repast; and it was only after having inspired them with the greatest security that it would seize a fowl and tear it to pieces. Some young cats have experienced from it the same sort of treatment."

Genus AILURUS.

Dental formula:—Incisors $\frac{6}{6}$; Canines $\frac{1-1}{1-1}$; Mo-

lars $\frac{5-5}{5-5} = 36$. In dentition this genus approaches that of the racoons; but the molars have their crowns studded with sharp tubercles, which, as in General Hardwicke's specimen, become worn down by long use. The molars of the upper jaw are broad and large, those of the lower jaw narrow. Fig. 75 represents the teeth of the Panda; *a* and *b* are the incisors, or front teeth, of the upper and lower jaw.



75.—Teeth of Panda.



76.—Feet of Panda.

THE PANDA. (*Ailurus fulgens*.)

The Panda is an inhabitant of the Himalayan Hills, between Nepál and the Snowy Mountains, and was first discovered by General Hardwicke, who published a description in the fifteenth volume of the 'Linn. Trans.' Subsequently M. Duvaucel sent the skin of the animal to Paris, and a description and figure were published by F. Cuvier in the fiftieth number of the 'Histoire des Mammifères,' which appeared prior to the paper by General Hardwicke.

The panda is a short-muzzled animal, covered with full soft fur, and having a tail of moderate length, resembling a lady's boa. In size the animal equals a badger, and is of a robust figure. Its limbs are stout: its feet five-toed; but the soles, instead of being naked, are covered with thick close wool, of a pure white in some specimens, of a grayish white in others, forming a singular contrast to the deep black of the legs and under surface. The claws are short, sharp, and semiretractile. Fig. 76: *a* represents the anterior foot, left side; *b*, the hinder foot, right side; *c*, the sole of one of the posterior



77.—Panda.

feet, showing its woolly covering.* The ears are short, pointed, and lined and tufted with white fur. The colour of the upper surface is beautiful fulvous red, the head being much paler; the muzzle is white, with a red dash beneath the eyes; the tail is banded red and yellow, but not very strongly; the limbs and under parts are abruptly black. The fur, which is very full and deep, consists of a woolly undercoat, with long soft hairs overlaying it. (Fig. 77.)

We learn from General Hardwicke that the haunts of the panda "are about rivers and mountain-torrents." It lives much in trees, and feeds on birds and the smaller mammalia; it is frequently discovered by its loud cry or call, resembling the word *wha*, often repeating the same; hence is derived one of the local names by which it is known. It is also called the Chitwa.

GENUS NASUA.

THE BROWN COATI. (*Nasua fusca*.)

The Coatis, or Coati-mondis (*Nasua*), are restricted to the warmer regions of the American continent, and in dentition and general economy approximate to the Racoons.

These curious animals, formerly placed by Linnæus with the Viverræ, cannot easily be confounded with those of any other group.

They may be known at once by the peculiar elongation of their snout, which projects considerably beyond the lower jaw. This snout is not, as in the hog, supported by a continuation of the nasal bone, but is a cylindrical and flexible proboscis,* with a truncated extremity, forming a sort of disc where the nostrils open, and altogether giving a singular character to their physiognomy. They turn it about in various directions while in search for food, and root with it in the earth in quest of worms and insects. The eyes are small, but quick; the ears moderate and rounded; the body long, deep, and compressed; the tail long; the limbs short and stout; the toes five on each foot, and armed with large powerful claws, well adapted for digging.

The fur is rather coarse, but long, full, and close; the tail is ringed with alternate bands of dark and pale tints—in the red coati (*Nasua rufa*) of rufous, in the brown coati (*N. fusca*) of dusky, brown. The canine teeth are remarkable for their size and sharpness, especially those of the upper jaw, which are compressed, and have a cutting edge both before and behind.

In captivity these animals sleep much during the day, and are most active as the evening advances, at which time they traverse their cage, turn their snout from side to side, and pry into every corner. They do not, however, pass the whole of the day in sleep, but are active for hours together, retiring to rest only at intervals. Their temper is capricious; we have, indeed, seen some individuals tolerably good-tempered, but most are savage, and their bite is very severe.

In drinking, the coati laps like a dog; but as its long snout would be in the way during this operation, it turns it up, so as to prevent its being submerged.

These animals are highly gifted with the sense of smell; they examine everything with their long nose, which is in almost perpetual motion. Their temper is irritable and capricious; they cannot be trusted, even by those with whose persons they are the most familiar; and, consequently, are not to be touched without great caution. Their voice, seldom exerted, is, under ordinary circumstances, a gentle hissing; but when irritated or alarmed, they utter a singularly shrill cry, something like that of a bird. They defend themselves vigorously when attacked by a dog, or any animal, and inflict desperate wounds. Like the racoon, they are said to be fond of the juice of the sugar-cane, but we know not on what authority. Azara does not allude to this partiality; it is, however, far from being improbable. In climbing they descend head foremost, being in this respect unlike the bear, which animal they far surpass in activity, being indeed better climbers than even the cat, and exceeded among their own tribe only by the kinkajou, whose prehensile tail gives it a great advantage.

In their native climate they tenant the woods, living

for the most part in small troops among the trees, which they climb with great address, and prey upon birds which they surprise, rifling also their nests of eggs or unfledged young. Worms, insects, and roots form also part of their diet.

The colour of the brown coati (*N. fusca*) is very variable, the brown being more or less tinged with yellow, and sometimes shaded with black; the under surface is yellowish gray; the snout is generally black, and several spots or marks of grayish yellow encircle the eye. It is a native of Brazil, Guiana, and Paraguay.

THE RUFOUS COATI. (*Nasua rufa*).

We have already alluded to the genus *Nasua* as one of those forms which link the *Ursidæ*, on one side, with the *Mustelidæ*, or Weasel tribe, on the other. (Fig. 78.)



78.—Rufous Coati.

The rufous coati in habits and manners agrees with the brown coati, living in pairs or small troops in the forests of South America, and climbing with great facility; but their mode of climbing does not resemble that of the cat or the squirrel, or of any of the light-limbed and sharp-clawed animals;—they do not run up a tree and bound from branch to branch, but proceed in the same heavy manner as on the ground; and it is because they can apply the palm of their paws, or the sole of their hind-feet, fairly to any object (not, however, grasping it), that they are enabled thus to climb. They use their feet, in fact, in the same manner as man, and their mode of climbing resembles his, except that their paws do not grasp; in descending, they generally come down hind-quarters foremost, carefully availing themselves of every projection. The bear always does so, and, as far as we have observed, the racoon also.

GENUS CERCOLEPTES.

Dental formula :—

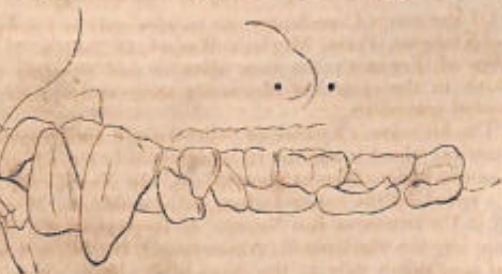
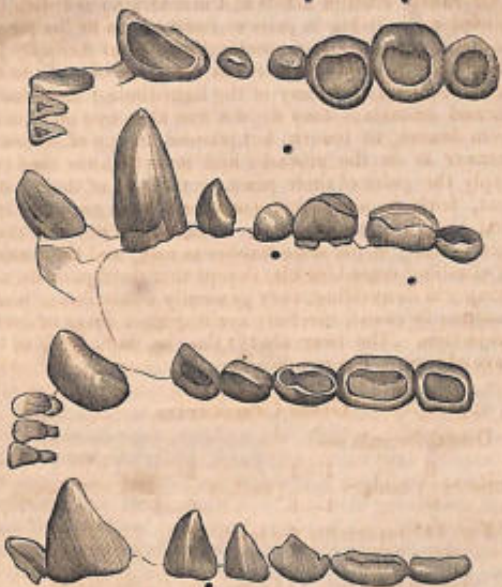
$$\text{Incisors } \frac{6}{6}; \text{ canines } \frac{1-1}{1-1}; \text{ molars } \frac{5-5}{5-5} = 36.$$

Fig. 78* represents the teeth of the Kinkajou.

THE KINKAJOU. (*Cercolestes caudivolvulus*.)

Of the genus *Cercolestes* one species only is known, the Kinkajou, Potto, Mexican Weasel, or Yellow Macaoco of Pennant; the true affinities and situation of which in the system of Mammalia seem sadly to have puzzled naturalists.

The kinkajou is a native of Southern and Intertropical America, where it appears to be extensively spread, and is known under different appellations. In New Granada it is called by the native Indians, Gushumbi, and Manaviri in the mission of Rio Negro. In its manners it much resembles the coati-mondi (*Nasua fusca*), but differs from that animal not only in the shape of the head, which is short and compact, but also in having a prehensile tail.



78*.—Teeth of Kinkajou.

Of recluse and solitary habits, the kinkajou lives for the most part among the branches of trees in large woods or forests, and is in every respect well adapted for climbing: being, however, decidedly nocturnal, it is but little exposed to the observation even of those who sojourn among the places frequented by it. During the day it sleeps in its retreat, rolled up like a ball, and, if roused, appears torpid and inactive. As soon, however, as the dusk of evening sets in, it is fully awake, and is all activity, displaying the utmost restlessness and address, climbing from branch to branch in quest of food, and using its prehensile tail to assist itself in its manœuvres. Few mammalia are more incommoded by light than the kinkajou: we have seen the pupils of the eyes contracted to a mere round point, even when the rays of the sun have not been very bright, while the animal at the same time testified by its actions its aversion to the unwelcome glare.

In size the kinkajou is equal to a full-grown cat, but its limbs are much stouter and more muscular, and its body more firmly built. In walking, the sole of the foot is applied fairly to the ground, as in the case of the badger. Its claws are strong and curved, the toes on each foot being five. The ears are short and rounded. The fur is full, but not long, and very closely set. There is no animal among the Carnivora (as far as our experience goes) in which the tongue is endowed with more remarkable powers of extension. Among ruminating animals, the giraffe is, as we know, capable of extending this organ to a very great length, and of using it much in the same manner as the elephant does the extremity of his proboscis, drawing down by it the twigs and boughs of the trees, upon the leaves of which the creature feeds; in like manner can the kinkajou thrust forth its tongue, a long and slender instrument, capable of being inserted into crevices or fissures, in search of insects, reptiles, or the eggs of birds. Baron Humboldt informs us that this animal is an extensive devastator of the nests of the wild bee, whence the Spanish missionaries have given it the name of "honey-bear," and that it uses its long tongue to lick up the honey from the cells of the comb. In

addition, however, to this food, birds, eggs, small animals, roots, and fruits constitute the diet of the kinkajou; and, as we have seen, it will draw these articles towards it with its tongue, when presented just within its reach. In drinking it laps like a dog, and also makes use of its fore-paws occasionally in holding food, and even in conveying it to the mouth, as well as in seizing its prey. In its aspect there is something of gentleness and good-nature; and in captivity it is extremely playful, familiar, and fond of being noticed. In its natural state, however, it is sanguinary and resolute. (Fig. 79).



79.—Kinkajou.

An individual of this species died at the gardens of the Zoological Society: it had lived in the possession of the Society about seven years, and was remarkable for gentleness and its playful disposition. During the greater

part of the day it was usually asleep, rolled up in the inner partition or box of its large cage; this, indeed, was invariably the case in the morning, unless purposely disturbed, but in the afternoon it would often voluntarily come out, traverse its cage, take food, and play with those to whom it was accustomed. Clinging to the top wires of its cage with its hind-paws and tail, it would thus suspend itself, swinging backwards and forwards, and assuming a variety of antic positions. When thus hanging, it could bring up its body with the greatest ease, so as to cling with its fore-paws as well as the hind pair to the wires, and in this manner it would travel up and down its cage with the utmost address, every now and then thrusting forth its long tongue between the wires, as if in quest of food, which, if offered outside its cage, it would generally endeavour to draw in with this organ. It was very fond of being stroked and gently scratched, and when at play with any one it knew, it would pretend to bite, seizing the hand or fingers with its teeth, as a dog will do when gambolling with its master, but without hurting or intending injury. As the evening came on, its liveliness and restlessness would increase. It was then full of animation, traversing the space allotted to it in every direction, examining every object within its reach, rolling and tumbling about, and swinging to and fro from the wires of the cage: nor was its good-humour abated; it would gambol and play with its keepers, and exhibit in every movement the most surprising energy. In this state of exercise it would pass the night, retiring to rest on the dawn of the morning. The age of this individual is not ascertained; the state of its teeth, however, which are much worn down, shows it to have attained an advanced period; its colour was a pale yellowish gray, inclining to tawny—the hairs, in certain lights, have a glossy appearance. Its dissection and death fully confirmed the propriety of assigning it a place among the plantigrade Carnivora.

The Binturong (*Arctitiu Binturong*, Temminck; *Tetides ater*, F. Cuv.) seems to take the place of the kinkajou in the forests of Java and Sumatra. These

animals are prehensile-tailed and artoreal, and resemble the racoons in the principal details of their dentition. They live both on animal and vegetable food, and are particularly fond of plantains; they also eat eggs and birds.

ORDER.—MARSUPIALIA.

Most zoologists of the present day, and among them the first comparative anatomists, concur in regarding the Marsupial animals (Marsupialia or Marsupiatæ*) as a distinct group, or sub-class, of the Mammalia. They differ essentially from all others in their organization, yet comprehend genera fed by every variety of nutriment. Some are insectivorous or carnivorous, others herbivorous, and others again frugivorous; some are diurnal, others nocturnal in their habits. Accordingly we find a corresponding modification of the teeth and digestive organs, as well as of those of progression and prehension. Hence may we trace in them analogies to the groups of the ordinary mammiferous quadrupeds, viz., to the Carnivora, the Insectivora, the Rodents, and the Edentata, as was well observed by Cuvier, whose opinions have been abundantly confirmed. It is on physiological grounds that the distinctness of the Marsupials rests: that is, on their structure and economy connected with the reproduction of their species, on the abbreviated term of gestation, and on the immature condition of the young at their birth, which are generally received into the marsupium or pouch, in which nidus the undeveloped being attaches itself to the teats, receives nutriment, and grows, till at length it is capable of acting for itself. In some instances the marsupium is nothing more than a fold of skin, and sometimes it is wanting; but two bones, situated on the anterior part of the pelvis, and termed the marsupial bones, are never absent. These grounds of distinction have been extended by the researches of

* *Marsupium*, a purse or pouch.

anatomists, and among them in particular Professor Owen, who has pointed out several never-failing accordances in the structure of other organs, as the heart and the brain, and also has cleared up many points respecting which doubts had previously existed. Into the series of facts and deductions so luminously treated by that philosophic investigator of nature, the plan of this work forbids us to enter: we refer our readers, however, to the 'Phil. Trans.,' part ii., 1834; the 'Proceed. Zool. Soc. Lond.,' 1831, 1833, 1838, and 1839; 'Phil. Trans.,' part i., 1837; 'Annals of Nat. Hist.,' Nov., 1839; 'Proceed. Geol. Soc. Lond.,' vol. iii., 1838-9, &c.

The Marsupial animals are all restricted to two portions of the globe, namely, America and Australia, including certain islands of the Indian Archipelago. The American species were the first known to European naturalists, and, indeed, the only ones with which Linnæus was acquainted. Captain Cook introduced the kangaroo of Australia to science, and subsequent researches in that region, the newest continent, have made us now familiar with its Fauna and Flora. Upwards of seventy species of Marsupials are known as Australian, besides about eighteen species belonging to other groups of quadrupeds, as the dingo dog, certain seals, a few bats and Rodents. The Marsupial sub-class contains the following families, viz.: 1. *Didelphidæ*. 2. *Dasypodidæ*. 3. *Myrmecobiidæ*. 4. *Peramelidæ*. 5. *Macropidæ*. 6. *Phalangistidæ*. 7. *Phascotomyidæ*. 8. *Monotremata*. Of each of these family sections we shall give examples.

OPOSSUMS.

THE VIRGINIAN OPOSSUM. (*Didelphis Virginiana*.)

The genus *Didelphis*, of which the Virginian opossum is an example, is restricted to America. It contains about twenty species, some of which are very small.

The teeth are as follows:—upper incisors ten, of which the two middle are longer than the rest, and



80.—Teeth of Virginian Opossum.

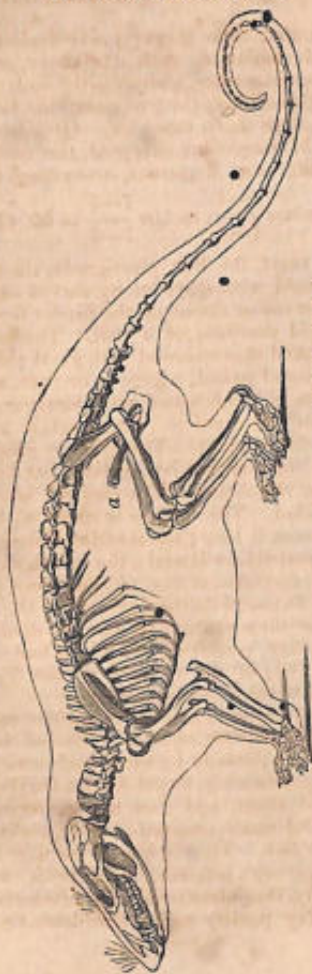
somewhat "separated from them; lower incisors eight; canines as usual; molars on each side above, seven, the first three false, triangular, compressed; molars below, seven, the first three false; the true molars both above and below crowned with sharp tubercles. Of all terrestrial mammalia, the *Myrmecobius* excepted, the teeth are in these animals the most numerous, amounting to fifty:

$$\text{Incisors } \frac{10}{8}; \text{ canines } \frac{1-1}{1-1}; \text{ molars } \frac{7-7}{7-7} = 50. (\text{Fig. 80.})$$

The limbs are short, the feet plantigrade, the toes five on each foot, armed with sharp strong curved claws, excepting the inner toe or thumb on the hinder feet, which is opposable, and destitute of a nail. The soles are covered with a naked skin endowed with great sensibility. The tail is scaly and naked, except at its base, and constitutes an organ of prehension, not, however, to the same extent in every species. The head is long and pointed, the profile straight. The eyes are small, dark, prominent, and undefended by eyelids, but furnished with a nictitating membrane. The ears are large, thin, naked, and rounded. The tongue is rough with horny papillæ. The snout is long; the muzzle pointed, naked, and moist; the nostrils are lateral; the mouth extremely wide; and the expression of the physiognomy peculiar and unpleasant. In one division of this genus the females have a pouch for their young; in another division the pouch is rudimentary, consisting of a slight fold of skin.

In the figure (81) of the skeleton of the Virginian opossum, the marsupial bones (*a*) are seen.

The Virginian opossum, and its immediate relatives, are slow in their movements, and nocturnal in their habits; they reside habitually on the branches and in the hollows of trees, remaining torpid during the day. At night they prowl about, and feed upon insects, eggs, birds, reptiles, and small mammalia, adding also fruits and roots to their diet. Their sense of smell is in high perfection. Like our pole-cat, as respects voracity though not activity, they often invade the precincts of the farm-house, destroy poultry and other domestic birds,



81.—Skeleton of Virginian Opossum. *a*, The Marsupial Bones.

and retreat on the first appearance of dawn, leaving their slaughtered victims behind. Their odour is disgusting, especially when alarmed or irritated.

The Virginian opossum is common in many parts of North America, from Mexico to the southern provinces of the United States. It is one of the largest and most robust of the genus, and equals a cat in size, being about twenty-two inches in the length of the head and body measured over the curve of the back; the tail is fifteen inches long. The under fur is deep and woolly, traversed by long straight whitish hairs, often tipped with brown. The ears are large and black, margined at the tip with white. The scaled portion of the tail of a whitish tint. The general colour of the fur is dirty-white, with a slight yellow hue; the legs are dusky-brown, a tint of which surrounds the eyes. Hairs of moustache long and white, with a few of a black colour intermixed. (Fig. 82.)

There is nothing pleasing either in the appearance or habits of the Virginian opossum: in captivity it is slothful in the extreme, and becomes inordinately fat, eating both animal and vegetable diet. Whatever may be its cunning in a state of liberty, it evinces but little intelligence when caged in our climate, but appears to be a compound of indolence and apathy, not unmixed with timidity. In its native woods it suffers from the attacks of birds and beasts of prey, and is also hunted by man for the sake of the flesh and fat. "As soon as the opossum discovers the approach of his enemies, he lies perfectly close to the branch, or places himself snugly in the angle where two limbs separate from each other. The dogs, however, soon announce the fact of his presence by their baying, and the hunter, ascending the tree, shakes the branch upon which the animal is seated, with great violence, so as to alarm and cause him to relax his hold." In this way, driven from branch to branch, he is obliged at last to drop to the ground, where, unless the dogs are vigilant, the animal escapes; for, as is asserted, it steals slowly and quietly to a little distance, and, gathering up itself into a small compass, assumes the



82.—Virginia Opossum.

stillness and attitude of death. This artifice, under the obscurity of night, and amidst dense rank herbage, or tangled underwood, often proves successful. In the 'Perfect Description of Virginia,' 1649, it is noticed as a beast "that hath a bagge under her belly, into which she takes her young ones, if at any time affrighted, and carries them away." Lawson states that "the 'Possum is found nowhere but in America. She is the wonder of all the land animals, being the size of a badger, and near that colour. The female doubtless breeds her young at her teats, for I have seen them stick fast thereto, when they have been no bigger than a small raspberry, and

seemingly inanimate. She has a paunch or false belly, wherein she carries her young, after they are from those teats, till they can shift for themselves. Their food is roots, poultry, or wild fruits. They have no hair on their tails, but a sort of a scale, or hard crust, as the beavers have. If a cat has nine lives, this creature surely has nineteen; for if you break every bone in their skin, and mash their skull, leaving them for dead, you may come an hour after, and they will be gone quite away, or perhaps you may meet them creeping away. They are a very stupid creature, utterly neglecting their safety. They are most like rats of anything. I have, for necessity in the wilderness, eaten of them. Their flesh is very white, and well tasted; but their ugly tails put me out of conceit with that fare. They climb trees as the racoons do. Their fur is not esteemed nor used, save that the Indians spin it into girdles and garters." The prehensile power of the tail serves the animal in more ways than one, for it is stated that the little ones when advanced in growth leap upon their mother's back if they are frightened, and, twisting their tails round hers, escape, with her assistance, the threatened danger.

This animal climbs with great facility, and will hang suspended from the branches by its tail, and by swinging its body contrive to fling itself to the adjoining boughs. It is often observed hanging motionless for a considerable time with its head downwards.

The opossum produces several young, sometimes as many as sixteen at a birth. She makes a thick nest of dry grass, in some obscure retreat, in which to conceal herself. When first born the young are in a most rudimentary state, minute, blind, naked, and shapeless. Yet even in this state they are always found adhering to the teats of the mother, shrouded in her pouch. There they remain until they have attained the size of a mouse, which is not until the fiftieth day, at which period their eyes are opened, and their bodies are covered with hair. They now venture occasionally from their hiding-place, returning to it on the least appearance of danger; nor is

it until they have attained to a considerable size that they finally quit their anxious parent. The period of gestation is said to be twenty-six days.

MERIAN'S OPOSSUM. (*Dide'phis dorsigera*.)

Among the opossums, in which a fold of the skin of the abdomen forms only a rudimentary pouch, must be enumerated Merian's Opossum. Though the other opos-



83.—Merian's Opossum.

sums with complete marsupial pouches occasionally carry their young on the back, with their tails twined round that of the parent, still it is in these pouchless species that this curious habit most usually prevails; hence the term *dorsigera*, which, though applied to the present animal, might with equal propriety be given to other species, as *Didelphis brachyura*, *cinerea*, *tricolor*, and *murina*.

Merian's opossum is a native of Surinam, and in its habits it agrees with the rest of the genus. The tail is slender, and longer than the head and body taken together; at the base it is clothed with fur resembling that of the body generally; the naked portion is of a pale brown tint. The fur of this animal is short and lies close; on the upper parts of the body it is grayish brown, the roots of the hairs being paler. The under parts of the body are yellowish white; a deep brown spot encircles the eyes: the forehead, top of the head, cheeks, outer side of the limbs and feet, are yellowish white. Length from nose to root of tail about six inches; length of tail seven inches. A beautiful specimen of this active little opossum, with its young clinging to it, is preserved in the British Museum. (Fig. 83.)

THE YAPOCK. (*Cheironectes palmatus*.)

This interesting animal, the yapock, is a native of Brazil, tenanting the smaller streams and rivers, and it appears to extend from the confines of that empire to the shores of the Gulf of Honduras. Buffon's specimen was procured in Cayenne. He terms it "*Petite Loutre de la Guyène*." It is also called "*Demerara otter*."

The yapock measures from ten to fourteen inches long in the head and body, the tail being rather more. The limbs are short, and the contour of the body elongated. The ears are moderate, the nose pointed; the fur of the body close, short, somewhat crisped and glossy; the tail, excepting at the base, is scaly, the scales being spirally arranged and interspersed with fine, short, bristly hairs. The forefeet are divided into five long and slender toes,

armed with small weak claws, the innermost or thumb excepted, which has a flat nail. It is not opposable, though placed rather behind the general line of the other toes. On the outside of the wrist there is an elongated tubercle (the pisiform bone developed) resembling a sixth finger, the use of which is not apparent. The hind feet, which are broad, are each divided into five toes, tied together by ample webs; the claws are small; the inner toe has a flat nail. This curious animal is furnished with cheek-pouches of great size, which extend far back along the sides of the mouth, and this circumstance, as Mr. Ogilby remarks, "hitherto unobserved by



zoologists, throws considerable light upon the habits of this rare animal, which thus appears, like the ornithorhynchus, to feed upon fresh-water crustacea, the larvæ of insects, the spawn of fishes, &c., which it probably stows away in its capacious cheek-pouches." Small fishes are doubtless among its prey. (Fig. 84.)

The yapock, unlike the opossums, is incapable of climbing: it is an aquatic animal, like the otter, and lives in holes along the banks of the rivers which it frequents, and in which it seeks its food. It is said to take its young early to the water. Two specimens, in the possession of the celebrated naturalist M. Natterer, were caught near water not far distant from Rio Janeiro, and a third was captured alive near Para, in a basket similar to those used in this country for catching eels. It had made its way through the funnel-shaped entrance, under water, and could not return.

The dentition of the yapock differs in some points from that of the opossums: the incisor and canine teeth are the same in both, but the molars are only five on each side, two false and three true, both in the upper and under jaw. The ground colour of the upper surface is dusky black; a white semilunar mark passes from ear to ear across the forehead; on each side are four large transverse marks of delicate gray, one on the scapula, and three on the sides of the body, forming bands interrupted or rendered incomplete by a middle dorsal line. The under surface is white, the tail is black, its tip (the extent varying from half an inch to three or four inches) being white.

THE BRUSH-TAILED PHASCOGALE.

(*Phascogale penicillata*.)

This animal, the "Tapoa tafa" of White, is a native of Australia. It is found throughout the colony of New South Wales, and is common on Liverpool Plains; Mr. Gould saw it also at Adelaide, in South Australia, where it frequently enters the houses. It is arboreal in its habits, and feeds on small birds, insects, &c.; but little is known respecting its general economy.

LIST OF ILLUSTRATIONS.

	Page		Page
Female Hippopotamus and Young	9	Boar Hunt	73
Skeleton of Hippopotamus	12	Boar-hunting in India	73
Rhinoceros	16	Skull of the Hog	76
Indian Rhinoceros	17	Teeth of the Hog	77
Otto	18	Domestic Hog	80
Skeleton of Rhinoceros	21	Teeth of Phacochære	84
Indian Rhinoceros	23	African Boar	86
Javanese Rhinoceros	25	Abyssinian Phacochære	89
Skull of Javanese Rhinoceros	28	Skull of Fossil Adapis	90
Sumatran Rhinoceros	29	Molar of Mastodon, not worn	92
Black Rhinoceros and Young	31	Molar of Mastodon, much worn	92
African Rhinoceros	32	Skeleton of Mastodon	93
Rhinoceros Keltia	39	Outline of Palæotherium magnum	96
White Rhinoceros	41	Outline of Palæotherium minus	96
Two-horned Rhinoceros	43	Skeleton of Palæotherium magnum	97
Skull of Fossil Rhinoceros	44	Skeleton of Palæotherium minus	97
Skull of Daman	45	Skull of Palæotherium magnum	99
Skeleton of Daman	46	Molar Teeth of upper jaw of the same, seen from above	99
Hyrax	47	External view of part of the lower jaw of the same	99
Skull of African Tapir	51	Teeth of Lophiodon	101
Teeth of Sumatran Tapir	52	Anoplotherium	103
Skeleton of American Tapir	53	Ditto	103
American Tapir	54	Lower Jaw of Dinotherium	104
Ditto	55	Skull of Dinotherium	105
Young Tapir	56	Ditto	106
Teeth of Collared Peccary	60	Palatal view of Skull of Dinotherium	107
Collared Peccary	61	Molar Teeth of Dinotherium	108
Giroussa	64	Occipital condyles of Dinotherium	109
Head of Babiroussa, seen in Profile	65	Dinotherium	110
Skull of Babiroussa	65		
Teeth of Babiroussa	66		
Female Wild Hog and Young	69		
Boar Hunt	71		

	Page		Page
Fossil Skull of Toxodon	112	Skull of Spermaceti Whale, in back view	158
Ditto	113	Inside of Greenland Whale	160
Ditto	113	Skull of Greenland Whale, in profile	161
Part of lower jaw of Toxodon	113	Skull of Greenland Whale, upper view	161
Mensor of Ditto	114	Skull of Greenland Whale, un- der view, lower jaw retracted	161
Tooth of Toxodon	115	Skeleton of Greenland Whale	163
Ditto	116	Greenland Whale	164
Ditto	116	New Zealand Whale	168
Femur of extinct Australian Pachyderm	120	Skeleton of Narwhal	170
Molar Tooth of ditto	120	Skeleton of Seal	172
Ditto	120	Skull of Seal, upper view	174
Vascular Apparatus of Whale	127	Skull of Seal, lower view	174
Skeleton of Dugong	128	Skull of Seal	175
Skeleton of Manatee	128	Teeth of Seal	176
Skull of Dugong	129	Common Seal	178
Skull of Manatee	129	Ditto	178
Teeth of Manatee	130	Harp-Seal	180
Teeth of Dugong	131	Immature Harp-Seal	181
Dugong	132	Teeth of Sea-Leopard	183
Manatee	134	Skull of Sea-Leopard	183
Fossil Teeth of Zeuglodon	135	Sea-Leopard	184
Skull of Dolphin	137	Teeth of Crested Seal	185
Section of Head of Porpoise	138	Skull of Crested Seal	185
Teeth of Porpoise	141	Crested Seal	186
Common Porpoise	142	Teeth of Elephant-Seal	188
Skeleton of Porpoise	143	Skull of Elephant-Seal	189
Skull and Tooth of Narwhal	145	Elephant-Seals. Males	190
The Narwhal	147	Elephant-Seal. Female	191
Beluga	150	Teeth of Ursine Seal	193
Spermaceti Whale	152	Skull of Ursine Seal	194
Skull of Spermaceti Whale, in profile	154	Ursine Seal	195
Skull of Spermaceti Whale, seen from above	154	Skull of Sea-Lion	196
Spermaceti Whale	156	Forster's Sea-Lion	197
Lower Jaw of Spermaceti Whale	158	Skull and Lower Jaw of Walrus	200
Skull of Spermaceti Whale, seen from below	158	Molars and Incisors of Walrus	202
		Walrus, or Morse	203

END OF VOL. III.



85.—Brush-tailed Phascogale.

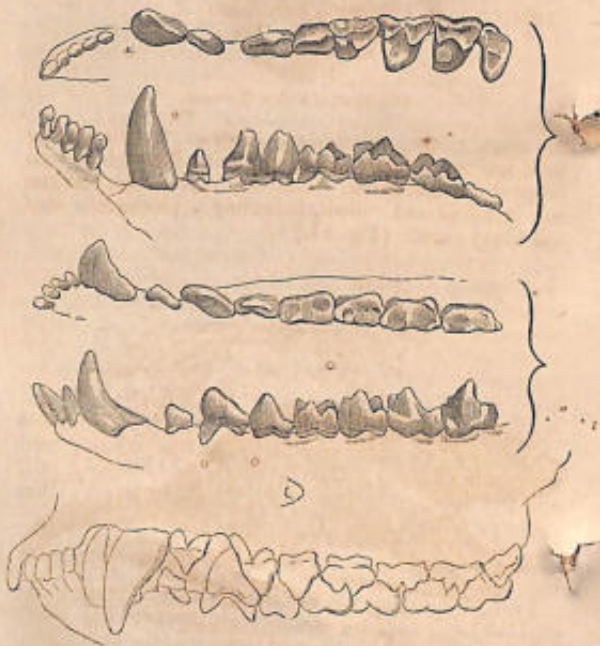
The brush-tailed phascogale belongs to the family of Dasyuridæ. In size it exceeds the common brown rat of our country; its tail is very bushy, and is probably used to assist in climbing. The fur of the body is long, full, soft and loose; the general colour above is gray; the under parts are white. (Fig. 85.)

THE URSINE OPOSSUM. (*Sarcophilus ursinus*, Cuvier.)

In their dental system the animals of this genus (*Sarcophilus*) approach the American opossums; they differ, however, in having only eight incisors in the upper jaw, and six in the lower. The canines are large; the false molars are two on each side, above and below: the true

molars four. Dental formula: Incisors $\frac{8}{6}$, canines, $\frac{1-1}{1-1}$,
 molars $\frac{6-6}{6-6} = 42$. (Fig. 86.) All the animals of this
 genus are Australian.

The ursine sarcophilus, or opossum, is a native of Van
 Diemen's Land, and is called by the colonists the *native
 devil*, by which name it was known upwards of thirty



86.—Teeth of the Ursine Opossum.

years back. Instead of being slender and active, as are the *Dasyuri*, this animal is thickset in its proportions and heavy in its movements. Its shape is not unlike that of a badger, but the head is thick, the muzzle short and stout, the eyes small, the mouth wide. (Fig. 87.) The limbs



87.—Head of Ursine Opossum.

are short, robust, and clumsy; the toes, five on the fore feet, four on the hind, are armed with large claws well adapted for burrowing. The heel is produced, and the sole is naked and callous, indicating a plantigrade step and heavy pace. (Fig. 88.)



88.—Ursine Opossum.

Like the bear, which it resembles in its actions and gait, the ursine opossum sits up on its haunches, and frequently uses its paws in conveying food to the mouth. Its voice is a hollow barking growl. The female produces four or five young at a birth: as in all the Marsupials, they are rudimentary, small, naked, and blind, and in this stage of their existence are found firmly adhering to the teats of the mother.

The ursine opossum measures twenty-one inches in length, exclusive of the tail, which is seven inches. The fur of the body is rather long, harsh, and black; a white gorget is conspicuous on the chest, and a white transverse mark often crosses the haunches. This animal is stupid and voracious in the extreme. Its habits are nocturnal, and it frequents the shore of the sea, feeding upon mollusca, carrion, &c. The flocks of the colonists in Van Diemen's Land, and domestic poultry, suffer from its ravages. During the day it conceals itself in burrows or holes in the ground.

Mr. Harris, who first described this species under the name of *Didelphis ursina*,* says, "These animals were very common on our first settling at Hobart Town, and were particularly destructive to poultry, &c. They however furnished the convicts with a fresh meal, and the taste was said to be not unlike veal. As the settlement increased, and the ground became cleared, they were driven from their haunts near the town to the deeper recesses of the forests yet unexplored. They are however easily procured by setting a trap in the most unfrequented parts of the woods, baited with raw flesh, all kinds of which they eat indiscriminately and voraciously. They also, it is probable, prey on dead fish, blubber, &c., as their tracks are frequently found on the sands of the seashore. In a state of confinement, they appear to be untameably savage, biting severely, and uttering at the same time a low yelling growl." We have had frequent opportunities of observing the ursine opossum in captivity. (Fig. 89.) Its heavy head and wide mouth give it a

* It was subsequently ranged under *Dasyurus*, from which it was removed by Cuvier.



89.—Ursine Opossum.

peculiar expression of ferocity unmingled with the slightest intelligence. When roused from its lethargy, it instantly displays its formidable teeth, ready to bite in a moment. It neither acknowledges its keepers nor those who habitually feed it: it keeps in the darkest part of the den, and the nictitating membrane of the eye is in perpetual motion, an indication that light is distressing. It feeds indiscriminately on bread and milk, and flesh. From the strength of its jaws, and the severity of its bite, the ursine opossum is more than a match for an ordinary dog, and, as Mr. Gunn states, is the most destructive animal to sheep in the colony. It is fierce, and defends itself obstinately.

THE DOG-HEADED THYLACINUS.

(Thylacinus Cynocephalus.)

This animal, called zebra opossum, and zebra wolf, tiger, hyæna, &c. is a native of Van Diemen's Land, where it is fortunately much rarer than the ursine opossum, otherwise it would prove a greater pest, from its size and strength. In stature it nearly equals a wolf; the head much resembles that of a dog, but the mouth is wider; the tail is thick at the base, becoming more slender to the point: it is covered with short close hairs of a brown colour. The general fur is short and smooth, of a dusky yellowish brown, barred or zebraed on the lower part of the back and rump with about sixteen black transverse stripes, broadest on the back and gradually tapering downwards, two of which extend a considerable way down the thighs. The ground-colour of the back has a tint of dusky gray. The eyes are large, full, and black. Length of head and body of adult male, nearly four feet; of the tail two feet; average height of back one foot ten or eleven inches. In the specimens we have examined, the tail appeared compressed, as was observed by Mr. Harris, its original describer. Mr. Gunn, however, in the 'Magazine of Natural History,' contradicts this part of Mr. Harris's statement.

Dental formula:—incisors $\frac{8}{6}$; canines $\frac{1-1}{1-1}$; molars $\frac{7-7}{7-7}$, =46.

The toes are 5 on the fore-feet, 4 on the hind-feet; the claws are blunt as in the dog: a narrow naked line runs up the back of the wrist from the ball, and also up the metatarsus of the hind limbs, to half the distance between the ball or pad and the heel. (Fig. 90.)

In its habits the dog-headed thylacinus is nocturnal, remaining concealed during the day in the caverns and fissures of the rocks, in the deep and almost impenetrable glens among the highest mountains of Van Diemen's Land. Like the ursine opossum it is distressed by the light, and



50.—Dog-headed Thylacinus.

brings the nictitating membrane of the eyes into perpetual use. During the night it prowls, hyæna-like, in quest of prey. The bush kangaroo and other animals it destroys, and even manages to eat the spine-covered echidna (or porcupine anteater), which is so protected by its panoply of spears as to seem almost invulnerable. An individual was caught by Mr. Harris in a trap baited with kangaroo flesh; it lived but a few hours, having received some internal hurt in securing it, and appeared to be stupid, inactive, and ferocious, uttering from time to time a short guttural cry; like the owl, it was constantly drawing and undrawing the nictitating membrane

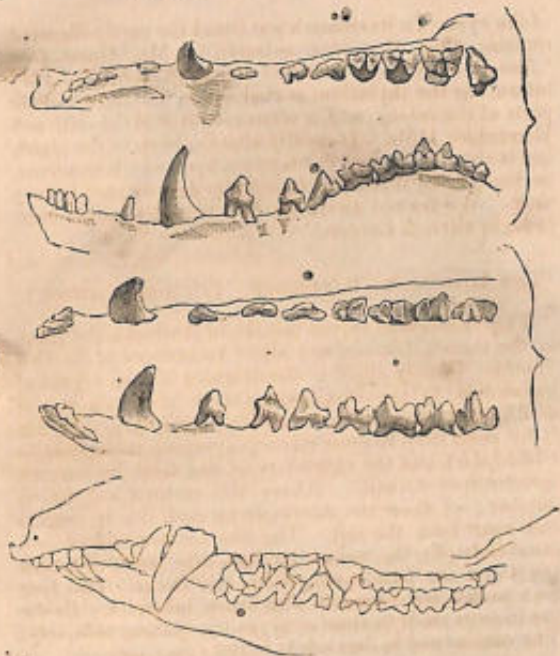
of the eye. In its stomach was found the partly-digested remains of a porcupine anteater. Mr. Gunn (see 'Annals of Natural History' for 1838, vol. i., p. 101) informs us the thylacinus is common in the more remote parts of the colony, and is often caught at Woolnorth and Hampshire Hills. It usually attacks sheep in the night, but is also seen during the daytime, upon which occasions, perhaps from its imperfect vision by day, its pace is very slow. We are not aware that this animal has ever been brought alive to Europe.

THE LONG-NOSED BANDICOOT. (*Perameles nasuta*.)

The Bandicoots appear to take in Australia the place of the shrews, tenrecs, and other Insectivora in the Old World. Closely allied in the structure of their organs of locomotion to the kangaroos, yet in their system of dentition they exhibit a remarkable difference. In this latter point they in some respects approach the opossums (*Didelphis*), and the characters of the teeth indicate an insectivorous appetite. Above, the incisors are 10 in number; of these the outermost on each side is conical and apart from the rest. The canines are curved and stand isolated; the molars on each side are 7, of which the 3 first are false, compressed, and sharp. The four true molars are crowned with sharp tubercles. Below the incisors are 6 in close array, and projecting obliquely. The canines and molars are as in the upper jaw.

Dental formula:—incisors $\frac{10}{6}$; canines $\frac{1-1}{1-1}$; molars $\frac{7-7}{7-7}$, = 48. (Fig. 91.)

The general contour and form of the bandicoots is rabbit-like, but the muzzle is elongated, narrow, and pointed, the nose advancing considerably beyond the jaw. The fore-feet are divided into five toes: of these the innermost is rudimentary, and the outermost a mere tubercle, having a minute nail. The three middle toes are large, and armed with strong claws. The hinder



91.—Teeth of Long-nosed Bandicoot.

limbs, though not developed to the same proportionate extent as in the kangaroos, exceed the fore-limbs. The metatarsus is elongated and naked beneath; the toes are four in number, viz., on the inner side, two toes joined in common integument, as in the kangaroos, each furnished with its distinct claw; a large and robust middle toe, with a straight strong pointed claw; and a small outer toe also armed with a straight claw. (Figs. 92, 93.)



92. — Long-nosed Bandicoot.

Though the system of dentition in the bandicoots is insectivorous, they do not refuse vegetable aliment; they live in burrows, for the digging of which their fore-paws are well adapted. In their movements these animals resemble a rabbit; they do not, like the kangaroo, bound from the hind limbs alone, but, arching the back, proceed with a saltigrade gait, that is half way between running and jumping; or rather by a succession of short leaps from the hind to the fore feet, but not with much speed, nor maintained for a great length of time. The kangaroos make considerable use of the tail, but in the bandicoots it is by no means so important an organ, though it assists them in sitting upright, an attitude usually assumed when eating, the fore-paws being brought into use as holders, like those of the squirrel. With these paws they scratch up the earth in search of roots and insects, and it is said that the potato

crops of the colonists in some districts suffer from their incursions. They are readily tamed, and in a few days become reconciled and familiar. Five species are now known: of these one is a native of New Guinea. The long-nosed bandicoot is found in New South Wales. It measures about 16 inches in the length of the head and body, and 5 in that of the tail. The ears are erect, pointed, and covered with short hair; the eyes are very small; the nose remarkably long, pointed and naked at the extremity. The tail is slender, and though better covered with hair bears some resemblance to that of a large rat. The hair is of two kinds, an upper and under coat; the hairs forming the upper or external coat are coarse and harsh. In colour it resembles the rat, except-



93.—Long-nosed Bandicoot.

ing that it is of a more sandy shade on the upper parts of the body, and of a more clear silvery white beneath. The under-coat, concealed by this outer garment, consists of soft ash-coloured wool or fur, well calculated to protect the animal from cold and variations of temperature; for it appears to be an inhabitant of the mountain districts of Australia, principally, if not exclusively.

The form and characters of its teeth would lead us to suppose that it fed almost entirely upon insects and similar creatures; and M. Geoffroy even imagines that it may use its long snout for the purpose of rooting up the earth like a pig in search of worms and grubs. The colonists however assert that these bandicoots are chiefly if not purely herbivorous, and that the principal part of their food consists of roots, which they dig up with their sharp and powerful claws. In the neighbourhood of human habitations they frequently enter into the granaries, and do as much mischief to the corn as the rats and mice of our own country. The Australians have however one advantage over the European farmers in this respect: the bandicoot is more easily excluded than the rat, for it cannot, like that destructive species of vermin, eat its way through the planks and timbers, and still less through the brick walls of buildings. It is probably from this habit of committing petty depredations upon the farm-yards and granaries, as well as from the general similarity of their external appearance, that the colonists of New South Wales sometimes confound the bandicoots with various species of murine animals originally found in the country under the common denomination of native rats and mice. Nor is it at all improbable, notwithstanding the assertion of the colonists to the contrary, that M. Geoffroy's conjecture as to the insectivorous habits of this animal may be at least partly if not entirely true. The common rat, with teeth much less adapted for living upon flesh than those of the bandicoots, is well known to have decidedly carnivorous propensities: and, as M. Geoffroy very correctly observes, it is seldom that analogous forms of dentition fail to indicate analogous appetites.

The insectivorous hedgehog eats the root of the plantain, boring with its snout under the plant so as to get fairly at it, leaving the leaves untouched.

THE CHÆROPUS. (*Chæropus Castanotis*, Gray.)

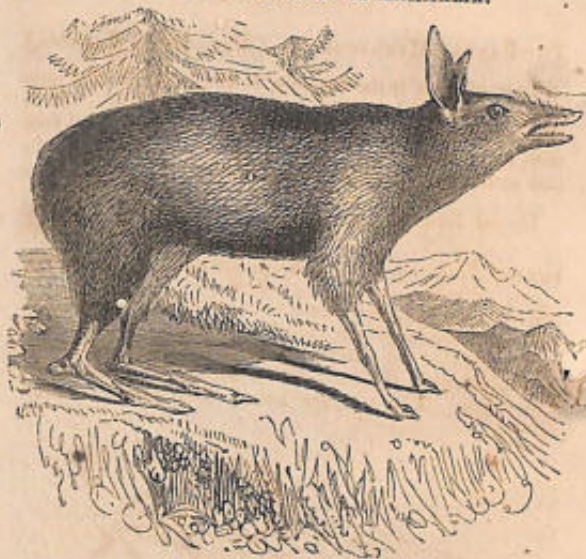
This animal, which is closely allied to the bandicoots, was first described by Mr. Ogilby (March, 1838) from a drawing made by Sir Thomas Mitchell. The animal was found by that officer on the banks of the river Murray during his expedition into the interior of New South Wales. The following is from his journal:—

“June 16, 1836. The most remarkable incident of this day's journey was the discovery of an animal of which I had seen only a head in a fossil state in the limestone caves of Wellington Valley, where, from its very singular form, I supposed it to belong to some extinct species. The chief peculiarity then observed was the broad head and very long slender snout, which resembled the narrow neck of a wide bottle; but in the living animal the absence of a tail was still more remarkable. The feet, and especially the fore-legs, were also singularly formed, the latter resembling those of a pig; and the marsupial opening was downwards, and not upwards, as in the kangaroo and others of that class of animals. This quadruped was discovered by the natives on the ground, but on being chased it sought refuge in a hollow tree, from which they took it alive, all of them declaring that they had never before seen an animal of the kind. This was where the party had commenced the journey up the left bank of the Murray, immediately after crossing that river.”

The specimen was presented to the Museum at Sydney. (Fig. 94.)

The drawing of the fore-foot very closely resembles that of the pig: two toes are represented short and of

* It has however been since ascertained that the animal has a tail nearly as long as that of the bandicoot. It was at first named *ecaudatus*, but in consequence of this fact having been ascertained the name was changed.



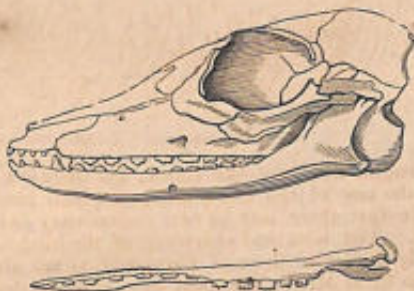
94.—Chiropterus.

equal length, with hoof-like claws; but there is a swelling at the base of the first phalanges, which renders it probable that there may be two rudimentary ones also present. The form and characters of the hind-feet are perfectly similar to those of *Perameles*, as are also the teeth, as far as Mr. Ogilby could judge from the drawing, except that the canines appeared much smaller. The ears are long, elliptical, and nearly naked; the head broad; the muzzle long and pointed; the body is described as being about the size of that of a small rabbit, and the fur much of the same colour and quality as in that animal. (See 'Proceed. Zool. Soc. Lond.,' March, 1838.) Most probably, in its habits and manners, the animal resembles the bandicoots, but we must wait for definite information before we can speak positively.

THE BANDED MYRMECOBIUS. (*Myrmecobius fasciatus*.)

This elegant little creature is the example of a new genus recently described by Mr. Waterhouse. It is thus characterized:—Fore-feet with five toes, hind-feet with four toes, all free; head elongated, snout produced; ears moderate, subacute; body slender; tail rather long.

Dental formula:—incisors, $\frac{8}{6}$; canines, $\frac{1-1}{1-1}$; false molars, $\frac{4-4}{5-5}$; true molars, $\frac{4-4}{4-4}$; = 52. The teeth are minute and insectivorous in their character; and the branch of the lower jaw (see Fig. 95) is twisted in such a manner, that the outer surfaces of the true molars come in contact with the masticating surface of those of the upper jaw. The toes are armed with strong curved claws.



95.—Skull and Lower Jaw of Banded Myrmecobius.

The Banded Myrmecobius is about the size of a squirrel. The fore part of the body is reddish, gradually blended into the black, which is the prevailing colour of the posterior half, and which is adorned with nine white bands. Fur of two kinds. Under hair scanty and whitish gray; upper hair rather coarse, short, and adpressed on the anterior parts; long on the posterior and under parts;

hairs on the anterior part of the back generally black at the base and fulvous at the apex; those on the head very short, brownish above, being composed of a mixture of black, fulvous, and a few white hairs; a few black hairs spring from the sides of the muzzle and under each eye;



95.—Banded Myrmecobius.

hair of the tail long and rather bushy; most of the hairs on the under part fulvous at the base and white at the tip; those on the under side of the tail generally black at the base and white at the apex. Length from nose to root of tail, ten inches; length of tail to the end of the hair, seven inches. (Fig. 96.)

It is a native of the district bordering the Swan River.

"This beautiful and interesting little animal," observes Mr. Waterhouse, "was first discovered by Lieut. Dale whilst on an exploring party in the interior of the country at the Swan River settlement, and was discovered about 90 miles to the south-east of that river. Two of these animals, says Lieut. Dale, were seen within a few miles of each other; they were first observed on the ground, and, on being pursued, both directed their flight to some hollow trees which were near. We succeeded in capturing one of them; the other was unfortunately

burnt to death in our endeavour to dislodge it by fumigating the hollow-tree in which it had taken refuge. The country in which they were found abounded in decayed trees and ant-hills. A second specimen has since been brought to England and placed in my hands for examination. I was informed this was brought from Van Diemen's Land, but Mr. Alexander Gordon, who had sent the specimen to England to be stuffed, has since assured me that I was misinformed, he having himself procured the animal at Swan River."

THE GREAT KANGAROO.

(*Macropus major*, and *M. Giganteus*, Shaw.)

The general aspect of the kangaroos is very peculiar; the anterior parts of the body are light and flexible, and the fore limbs are small. In contrast with these characters is the vast development of the hinder quarters, the haunch, hind limbs, and tail—parts of the frame in which the muscular power of the animals is concentrated.

The hinder limbs are voluminous and long: the metatarsus is produced, and furnished beneath with a naked callous pad, running from the toes to the heel. The ordinary attitude of the kangaroos is upright, with a forward inclination, the weight resting on the hind limbs, the long sole (or metatarsus) of which is applied to the ground, and also on the tail, which with the limbs forms a tripod for the support of the body. The chest is contracted, the body tapering from the haunches to the neck, the contour being pyramidal. The head is well proportioned and delicately turned. The fore-paws have 5 toes armed with strong sharp claws; the hind feet are divided into four toes; of which the two innermost are very small, and compacted together so as to appear as one; but the slender bones of each and the claws are distinct. The third or middle toe is large and powerful, well padded beneath, and armed with a strong hoof-like nail. The outer toe is less than the middle, but larger than the two inner toes together; its nail is in proportion. The



97.—Skeleton of the Kangaroo.

eyes are full; the ears rather large; the upper lip is cleft. There are perfect clavicles, and the arm enjoys considerable freedom of motion.

The skeleton of the Great Kangaroo (Fig. 97) well displays the difference in the development of the limbs, and the solidity of the osseous structure of the tail, which is clothed with voluminous muscles.

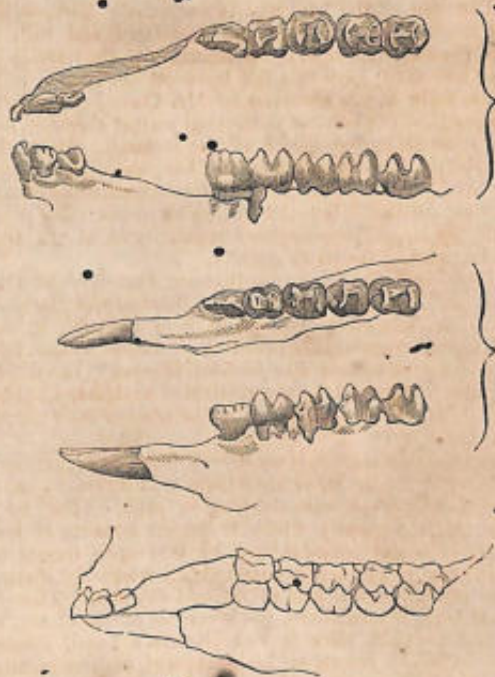
The dentition in the genus *Macropus* is as follows:—The incisors of the upper jaw are 6 in number; the lateral one on each side being the largest and furrowed. Between the incisors and the molars there exists a large unfilled space. The molars are five on each side, but the first is a false molar, and often wanting, being pushed out by the advance of those behind as the posterior ones rise from their sockets. In the under jaw the incisors are 2, long, powerful, and pointed; they advance horizontally forwards, and have a sharp oblique external edge opposed to the edge of the upper incisors.

The molars as in the upper jaw, and also rough, with two transverse sharp prominences, which wear gradually down, showing a fold of enamel encircling an osseous centre. Fred. Cuvier divided from the genus *Macropus* those kangaroos which had shorter ears, and a nearly naked tail, though their dentition is the same. He placed them in a genus which he termed *Halmaturus*.

Dental formula:—incisors, $\frac{6}{2}$; canines, $\frac{0-0}{0-0}$; molars,

$\frac{5-5}{5-5} = 28$. (Fig. 98.)

The ordinary mode of progression in these animals, as well as their flight from enemies, is by a series of bounds, often of prodigious extent. They spring from their hind limbs alone, neither the tail nor the fore limbs being in requisition. In feeding they assume a crouching hare-like position, resting on the fore paws as well as on the hinder extremities while they browse on the herbage. In this attitude they hop gently along, the tail being pressed to the ground. On the least alarm, however, they rise on their hind limbs and bound to a distance



98.—Teeth of Great Kangaroo.

with great rapidity. Sometimes, when excited, the male of the Great Kangaroo stands on tiptoe and on his tail, and is then of prodigious height. In fighting he balances himself for a moment on the tail, and strikes forward with both the hind legs, using his fore paws at the same time. The blows given by the hind feet are terribly effective.

The diet of the kangaroo is exclusively[•] herbaceous ; the stomach is very large and sacculated, and balls of hair, similar to those so often occurring in the stomach of cows and oxen, have in a few instances been found in it. These balls, as was observed by Mr. Owen, are entirely composed of the hairs of the animal matted together, and agglutinated by the mucus of the stomach. With the complexity of the stomach of the kangaroos is associated the act of rumination. The kangaroo ruminates while in its erect attitude ; but this act by no means takes place with the same frequency and regularity as in the true ruminants, viz. the ox or deer. •

The Great Kangaroo (the Boomer, Forester, and Old Man Kangaroo of the colonists ; Bundaary of the aborigines) is extensively spread in New Holland, in the intermediate country between New South Wales and South Australia, and also in Van Diemen's Land. It was first discovered by the celebrated navigator Captain Cook in 1770, while stationed on the coast of New South Wales.

The Great Kangaroo is not strictly speaking gregarious ; more than six or eight are seldom seen together ; most frequently it is met with singly or in pairs. (Fig. 99.) The kind of country which it prefers consists of low grassy hills and plains skirted by thin open forests of brushwood, to which Mr. Gould says it resorts for shelter from the oppressive heat of the mid-day sun. That it would bear, if naturalized, the severities of our winter, is beyond a doubt, since in Van Diemen's Land, among other places, it resorts to the bleak, wet, and frequently snow-capped summit of Mount Wellington.

The male greatly exceeds the female in size, measuring 7 feet 10 inches from the nose to the extremity of the tail, the length of the latter being little more than 3 feet. Instances have occurred of the weight being 220 pounds. The general colour is uniform grayish-brown, grizzled on the arm and under surface. A whitish mark runs above the upper lip, and is faintly traceable along the sides of the face. The hands, feet, and tip of the tail are black.

The kangaroo readily takes to the water, and swims



99.—Great Kangaroos.

well. It often resorts to this mode of escaping from enemies, among which is the dingo, or Australian dog. Man, however, is the most unrelenting foe of this inoffensive animal. The native employs several modes of obtaining it. Sometimes he steals upon it, under the covert of the trees and bushes, till within range of his unerring spear. Sometimes numbers of men unite in a large party, and, forming a circle, gradually close in upon the animals with shouts and yells, by which the animals are so terrified and confused, that they easily become victims to the bommerengs, clubs, and spears which are directed from all sides against them. The colonist

employs the gun, and a breed of dogs between the greyhound and bulldog, fierce, powerful, and very fleet, for the course. Many of these dogs, says Mr. Gould, are kept at the stock-stations of the interior for the sole purpose of running the kangaroo and the emu. The latter is killed solely for the supply of oil which it yields, and the former for mere sport, or for food for the dogs. "Although," he adds, "I have killed the largest males with a single dog, it is not advisable to attempt this, as they possess great power, and frequently rip up the dogs, and sometimes cut them to the heart with a single stroke of the hind leg. Three or four dogs are generally laid on, one of superior fleetness to *pull* the kangaroo, while the others rush in upon and kill it. It sometimes adopts a singular mode of defending itself by clasping its short but powerful arms around its antagonist, leaping away with it to the nearest water-hole, and there keeping it beneath the surface until drowned. With dogs the old males will do this whenever they have an opportunity, and it is also said they will attempt the same with man."

In Van Diemen's Land the Great Kangaroo is regularly hunted with foxhounds, as the deer or fox in England. The sport is said to be excellent. Mr. Gregson says, in a letter to Mr. Gould, "I recollect one day in particular when a very fine boomer jumped up in the very middle of the hounds, in the *open*. He at first took a few high jumps with his head up, and then, without a moment's hesitation, he stooped forward, and shot away from the hounds apparently without effort, and gave us the longest run I ever saw after a kangaroo. He ran fourteen miles by the map, from point to point, and, if he had had fair play, I have little doubt that he would have beat us. But he had taken along a tongue of land that ran into the sea, so that, on being hard pressed, he was forced to try to swim across the arm of the sea, which cannot have been less than two miles broad. In spite of a fresh breeze and a head-sea against him, he got fully half-way over; but he could not make head against the waves any farther, and was obliged to turn back, when, being quite exhausted, he was soon killed. The distance he ran,

taking the different bends of the line, was not less than eighteen miles." He was far before the hounds and quite fresh when he took to the water. His hind quarters weighed nearly seventy pounds. "We did not measure the distance of the hop of this kangaroo, but on another occasion, in which the boomer had taken along the beach, and left his prints in the sand, the length of each jump was found to be fifteen feet, and as regular as if they had been stepped by a sergeant. When a boomer is pressed, he is very apt to take to the water, and then it requires several good dogs to kill him; for he stands waiting for them, and, as they swim up to the attack, he takes hold of them with his fore feet, and holds them under water. The buck is very bold, and will generally make a stout resistance; for, if he cannot get to the water, he will place his back against a tree, so that he cannot be attacked from behind, and then the best dog will find him a formidable antagonist. The doe, on the contrary, is a very timid creature; and I have even seen one die of fear." (Fig. 100.)

The period of gestation in the kangaroo is thirty-nine days. The appearances presented by the young one twelve hours after birth, and adhering to the teat of the mother, within the pouch, are thus described by Mr. Owen:—"It resembled an earthworm in the colour and semi-transparency of its integument, adhered firmly to the point of the nipple, breathed strongly but slowly, and moved its fore legs when disturbed. Its body was bent upon the abdomen, its short tail tucked in between the hind legs, which were one-third shorter than the fore legs, but with the three divisions of the toes now distinct. The whole length from the nose to the end of the tail when stretched out did not exceed one inch and two lines." (Fig. 101.)

Though enabled by means of its lips to grasp the nipple with considerable firmness, the unaided efforts of the young one could not draw nutriment thence, and consequently the mammary gland is acted upon by a peculiar muscle, which, compressing it, forces out the milk into the mouth of the young. Mr. Owen remarks

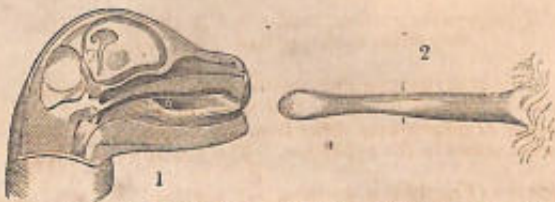


100.—Great Kangaroo.

that it can scarcely be supposed that the efforts of suction should always be coincident with the successive jets of milk, and that there might arise danger from the flow of milk into the little creature's larynx. To remedy this



101.—Outline of the Kangaroo about twelve hours after birth, showing its natural size and external development at this period. *a*, the upper nipple of the left side, to which it was attached; *b*, the lower nipple of the same side.



102.—1. Dissected Head of mammary fetus of a Kangaroo. 2. Teat of the mother; the mark shows how far it is taken in by the young.

there is a special contrivance, first described by Geoffroy, but which was not unnoticed by Hunter, as evidenced by preparations of the larynx and throat of two young kangaroos in the museum of the Royal College of Surgeons. (Fig. 102.)

"Thus aided and protected by modifications of structure," continues Professor Owen, "both in the system of the mother and in its own, designed with

especial reference to each other's peculiar condition, and affording, therefore, the most irrefragable evidence of creative foresight, the feeble offspring continues to increase from sustenance exclusively derived from the mother for a period of about eight months. The young kangaroo may then be seen frequently to protrude its head from the mouth of the pouch, and to crop the grass at the same time that the mother is browsing. Having thus acquired additional strength, it quits the pouch, and hops at first with a feeble and vacillating gait, but continues to return to the pouch for occasional shelter and supplies of food till it has attained the weight of ten pounds. After this it will occasionally insert its head for the purpose of sucking, notwithstanding another foetus may have been deposited in the pouch, for the latter, as we have seen, attaches itself to a different nipple from the one which had been previously in use."

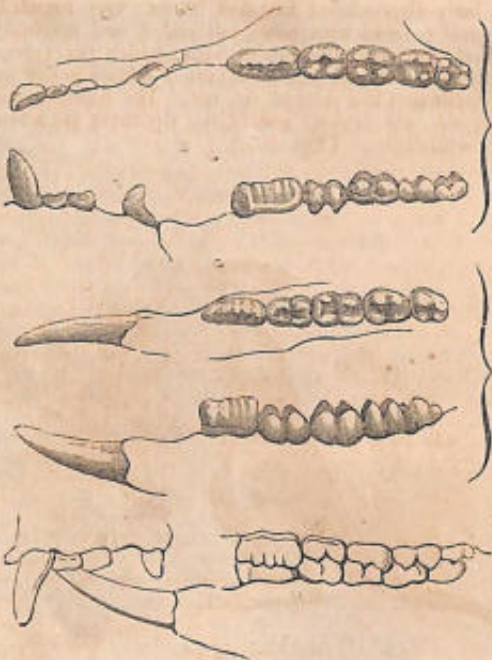
THE KANGAROO RAT, OR POTOROO

(*Hypsiprymnus murinus*, Pander and D'Alton). The Bettong of the natives of New South Wales.

It is principally in their dentition, and in the elongated narrow form of the head, that the little animals of the genus *Hypsiprymnus* differ from the kangaroos. There are canines in the upper jaw. The dental formula is as

follows (Fig. 103):—incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$; molars, $\frac{5-5}{5-5} = 30$. Fig. 104 represents the skull, the elongated contour of which is very conspicuous.

The Potoroo (the *Macropus minor* of Shaw; *H. setosus* of Ogilby; *H. Peronii*, Quoy and Gaimard) is about the size of a rabbit, measuring fifteen inches from the nose to the root of the tail, the latter being ten inches and a half in length. The general colour of the fur is brown; on the back blackish, pencilled with brownish-white. Lips, chin, throat, and under parts of



103.—Teeth of Kangaroo Rat.



104.—Skull of Kangaroo Rat.

the body dirty-white; fore feet brown; ears rounded, and well covered with hair; tail scaled, and sparingly clothed with short decumbent hairs, which (excepting at the base and extreme point) are of a black colour on the upper part and sides of the tail. The hairs on the under side are brown; and at the tip there are a few dirty-white hairs. (Fig. 105.)



105.—Kangaroo Rat.

The Potoroo is common in New South Wales. It is timid and inoffensive, feeding on vegetables, and proceeding in the manner of the kangaroo. Of its habits little is known. It frequents the precincts of scrubs and patches of brushwood, and scratches up the ground in quest of roots. These animals are found to be very destructive to the potato-crops, and are very readily caught by baiting traps with this vegetable.

Several other species have been described.

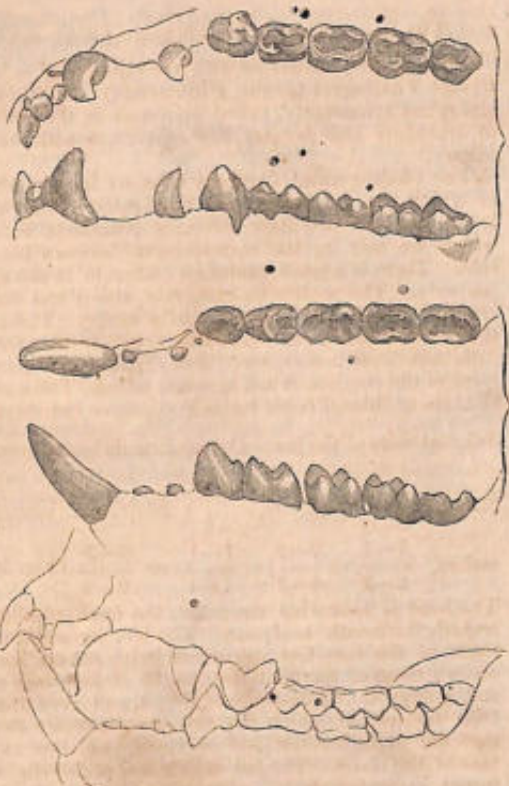
THE SOOTY TAPOA (*Phalangista fuliginosa*).

This animal presents us with the example of a group termed Phalangiers (genus *Phalangista*); but they are often, but erroneously, called opossums in the writings of travellers and persons not conversant with natural history.

The Phalangiers of Australia have six incisors above, of which the two middle are the largest; and in the lower jaw are two long obliquely projecting incisors, which are met by the corresponding incisors of each side. There is a small canine on each side in the upper jaw only. The molars on each side, above and below, are five, of which the first is a false molar. These are the constant teeth, but besides there are in some species little additional molars, sometimes canine-like molars, in front of the contiguous and constant series. The number of these additional teeth varies in the same individual on different sides of the jaw. Dental formula:—incisors, $\frac{6}{2}$;

canines, $\frac{1-1}{0-0}$; molars, $\frac{5-5}{5-5}$; additional inconstant molars, $\frac{1-1}{2-2}$, or $\frac{2-2}{3-3}$, or $\frac{1-1}{1-1}$, or $\frac{3-3}{2-2}$. (Fig. 106.)

The head is somewhat elongated, the forehead slightly arched, the mouth moderate. The feet have five toes; those of the fore feet are armed with strong hooked claws; those of the hind feet consist of four true toes, and a large thumb destitute of a nail, and very distinct from the rest, of which the two innermost are shorter than the two outermost, and are united together to the base of the claws. The tail is long and prehensile, well furred, excepting at the extreme point and part of the apical portion beneath, which is bare to a greater or less extent. We may here observe that the Phalangiers form three sections or subgenera. The first (*Phalangista*) is exclusively Australian, and has the tail naked beneath only at the tip. The second section comprehends a group



106.—Teeth of Sooty Tapoa.

(*Cuscus*) distinguished by having the tail throughout the greater part of its extent beneath naked, scaly, and highly prehensile. The ears are short and close. These animals inhabit the Celebes and Moluccas, where they are called

Couscous, or Coëskoëa. The third group (*Pseudocheirus*, Ogilby) has the tail less densely clothed than in *Phalangista* proper: the apical portion is naked beneath; the fore feet, with the two united inner toes, slightly opposed to the others.

Besides these are the Flying Phalangers, constituting a distinct genus, *Petaurus*. The true Phalangers, of which we figure the Vulpine Phalanger (*Ph. vulpina*), are animals of arboreal habits, residing almost constantly among the branches. Their food consists principally of fruits, buds, leaves, &c., but insects, eggs, &c., are also eaten. Night is their season of activity; during the day they conceal themselves in the hollows of trees, or lie close on the branches, hidden by the foliage. The number of young which the females produce at a birth appears to be two, at least if the account of Mr. Bennett (see 'Wanderings in New South Wales') is to be taken as a criterion. He states that on one occasion he was present when a number of flying squirrels (viz. flying phalangers), opossums (phalangers), bandicoots, snakes, &c., were caught by the natives during what he terms a hunting expedition, and that one of the opossums among the game was a female, and had two large-sized young ones in her pouch.

Though the Phalangers are at ease among the branches, the motions of these animals, generally speaking, are not distinguished by that nimbleness and rapidity which we so much admire in the squirrel. On the contrary, their motions are slow and cautious, and they use their prehensile tail as an additional security. When in danger of discovery, they are said to suspend themselves by the tail, hanging, head downwards, motionless as if dead; and this is more remarkably the case with the Couscous of the Moluccas. It is, indeed, reported that, if a man fix his eyes on one thus counterfeiting death, it will continue to hang till, no longer able to sustain the weight, the muscles of the tail relax with extreme fatigue, and the animal falls to the ground. Few animals have more soft and delicately woolly fur than the Phalangers: their skins are consequently highly prized by the abori-

gines, as well as their flesh, which is eaten with avidity, and doubtless is not inferior to that of the kangaroo.

Like many of the Marsupials, the Phalangers have an unpleasant smell, owing to a fluid secreted in certain glands; but this does not affect the delicacy and flavour of the flesh.

In captivity the Phalangers are not very attractive: during the day they slumber concealed among the hay or other bedding of their cage, shrouding themselves from observation, and are impatient of interruption; they do not, however, attempt to bite, and appear as stupid as they are sluggish: their form, however, is graceful, and their fur sets them off to much advantage. When feeding they sit up like the squirrel, holding the article of which they are partaking between the fore paws. During the night they traverse their cage, take their food, and enjoy the active hours of their existence. We know of no instance in which they have bred in Europe; but as the kangaroo produces young in our climate, it is not improbable that under favourable circumstances these animals also might multiply in our extensive menageries, especially as they appear to bear our climate very well, care being taken against their exposure to the severities of the weather.

The following description of the Sooty Tapoa was taken from a living specimen:—"The shape and proportions of *Phalangista fuliginosa* are those of the *Phal. vulpina*: the ears are also of similar shape and size, hairy on the outsides, but naked within. The colour is a uniform sooty-brown over all parts of the head and body, not even excepting the belly and the inner surface of the thighs. The hair has a frizzled appearance, but it is not so close nor so fine as in *Phal. vulpina*. The tail is long, black, and rather bushy; the naked slip underneath, as well as the nose and soles of the feet, which are also naked, is of a bright flesh-colour. The moustaches are large, stiff, and black." The individual was said to have been brought from Sydney. In the museum of the Zoological Society are seven or eight distinct species of this genus.



107.—Vulpine Phalanger.

THE VULPINE PHALANGER (*Phalangista vulpina*).

Of all the species the Vulpine Phalanger is probably the most carnivorous. The female is destitute of a true pouch, and the teats are two in number. The Vulpine Phalanger is about the size of a cat; in captivity it displays but little to interest ordinary observers, the day being passed in sleep; nor, when roused up by the approach of night, is it remarkable for activity or alertness. Its fur is soft, fine, and woolly; the predominating tint is grayish-brown, passing into a yellowish-gray on the shoulders; the tail is covered with long black fur, excepting along a line on the under side at the tip, which is naked. It is a native of New South Wales, and also

of Van Diemen's Land, where it is common. The tint of colouring is subject to considerable variation as respects intensity, intermediate shades being observable between the ordinary gray specimens and the Sooty Tapoa, which is regarded as a distinct species. The native name of the Vulpine Phalanger, according to White, is *Wha tapoa roo*.

THE SPOTTED COUSCOUS

(*Cuscus maculatus*. *Cuscus amboinensis*, Lacép.; *Phalangista maculata*, Geoffr.).

This species is a native of the islands of Amboina and New Guinea, where it is called Couscous or Coëscœs.



108.—Spotted Couscous.

M. Lesson found it at Waigiou, where it is called Scham-scham. It is arboreal, and its flesh is in request, being esteemed as delicate food by the natives. In colouring this animal is subject to much variation; generally the ground-tint is whitish, ornamented with isolated brown spots; these sometimes blend or run into each other. The fur is thick and woolly.

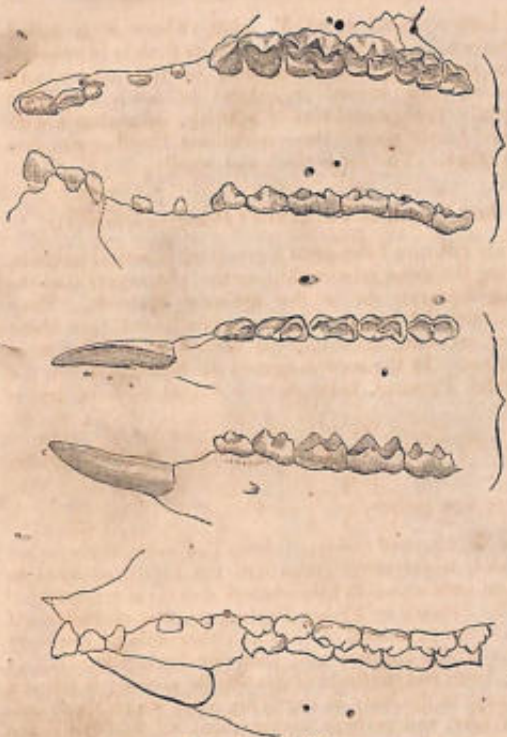
THE SQUIRREL *PETAURUS* (*Petaurus sciureus*).

This creature belongs to a group of beautiful animals, bearing the same relationship to the phalangers that the flying squirrels do to the ordinary squirrels. They constitute the genus *Petaurus*, subdivided into three minor sections, according to certain modifications of dentition. In the section termed *Belideus*, to which the Squirrel *Petaurus* belongs, the dental formula stands

thus (Fig. 109):—incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$; false molars, $\frac{3-3}{4-4}$; true molars, $\frac{4-4}{4-4} = 40$.

In the figure of the teeth, from F. Cuvier, the number of lower molar teeth (false and true) only amounts to five on each side; in other points also he is erroneous.

The *Petauri*, or Flying Phalangers, are characterized by a broad expansion of skin on either side of the body between the anterior and posterior limbs; the tail is free, long, and destitute of prehensile power; it forms a balancer to the body in the flying leaps which these animals take, and perhaps assists them in modifying the direction of their career. These animals are nocturnal in their habits, and feed upon fruit, leaves, and insects. During the day they conceal themselves in hollow trees, and are said generally to associate in small flocks. Their aerial evolutions, when the shades of evening have roused them to activity, are described as being peculiarly graceful, and their leaps apparently desperate. The Squirrel *Petaurus* is one of the most beautiful of the genus. It is



169.—Teeth of Squirrel Petaurus.

A native of New South Wales, and is called by the colonists the Sugar Squirrel and Norfolk Island Flying Squirrel. We have seen two of these animals in captivity: during the day they remained in a state of torpidity, rolled up in a bed of wool and soft hay. At night they became animated, and traversed their cage



110.—Squirrel Petaurus.

with great rapidity, leaping from one part to another, and gambolling in the exuberance of a sportive disposition. At the same time, they were timid and by no means remarkable for intelligence. While leaping, the lateral membranes are expanded so as to form a parachute. The following anecdote serves to prove both the daring extent of the leaps taken by these animals, and the power they certainly possess of turning or altering their course:—"On board a vessel sailing off the coast of New Holland was a Squirrel Petaurus, which was permitted to roam about the ship. On one occasion it reached the mast-head, and, as the sailor who was de-

spatched to bring it down approached, it made a spring from aloft to avoid him. At this moment the ship gave a heavy lurch, which, if the original direction of the little creature's course had been continued, must have plunged it into the sea. All who witnessed the scene were in pain for its safety; but it suddenly appeared to check itself, and so to modify its career that it alighted safely on the deck."

The Squirrel *Petaurus* is about eight inches long in the head and body, and as much in the tail. The fur is peculiarly delicate and soft; the general colour above is fine gray, somewhat darker on the head, and white beneath. A black line passes from the point of the nose along the back towards the full-furred tail; and the lateral folds of skin are bounded in front and on the sides by a similar band, which confounds itself gradually with the gray of the body: the outer margins of these expansions are fringed with white. The thumbs of the hind feet are strong, distinctly opposable to the sole, and destitute of a claw. The eyes are full and large. (Fig. 110.)

THE KOALA.

(*Phascolarctos cinereus*. *Lipurus cinereus*, Goldf.; *Phasc. fuscus*, Desmar.; *Phasc. Flindersii*, Less.; The Ashy Koala).

The Koala, or Ashy Koala, is the only species of the genus which has been discovered.

This extraordinary animal is thick and stoutly made, with robust limbs and powerful claws: there is no tail. The head is large, the muzzle blunt, and the naked space in which the nostrils are situated is continued along the nasal bones, till it nearly attains the level of the eyes. The ears are large, standing out from the sides of the head, and tufted with long full fur: the eyes are small. The fore feet have each five toes, armed with large sharp claws: these toes are divided into two sets; the first two forming a pair by themselves, and antagonizing with the other three. The hind feet have also five toes, viz. a large and powerful thumb destitute of a nail, and well



111.—Koala.

padded beneath, and four strongly-clawed toes, of which the two first, as in the phalangiers, are united together as far as the last joint. It may be here remarked that in some of the phalangiers (as Cook's phalanger, &c.) there is a decided tendency in the first two fingers of the fore paws to remain distinct and separate from the rest. The dentition approaches closely to that of the phalangiers.

Dental formula:—incisors, $\frac{6}{2}$; canines, $\frac{1-1}{0-0}$; false molars, $\frac{1-1}{1-1}$; true molars, $\frac{4-4}{4-4} = 30$.

The Koala is a native of New South Wales, but does

not appear to be very abundant ; at least it is seldom seen in collections of natural objects from that country. In its habits it is nocturnal and arboreal ; it climbs with great facility, and in passing along the branches suspends itself like a sloth by its claws, which in adults are very powerful. The female carries her young one, when able to leave the pouch, clinging to her back, and long continues her care of it. (Fig. 111.) The Koala however does not live exclusively on the trees : it visits the ground, and there burrows, and that with facility. In the cold season it is said to make a nest in its underground retreat, and retiring to it there to lie dormant. Its food is entirely vegetable, and consists, in part at least, of the young leaves of the gum-trees (*Eucalyptus*). It laps like a dog when drinking, and uses its fore paws in laying hold of the branches while it feeds. Its voice is a soft barking sound. On the ground its gait resembles that of a bear. Length of head and body about 26 inches. The fur is compact, woolly, and of an ashy gray, patched with white over the crupper : the inside of the thighs is rusty-gray.

The colonists term this animal native bear or monkey. By the Yas natives it is called Goribun.

THE WOMBAT

(*Phascolomys Wombat*, Péron and Lesueur; *Didelphis ursina*, Shaw).

The Wombat is the only known species of the genus to which it belongs. It is found in New South Wales, South Australia, and Van Diemen's Land, as well as in some of the islands in Bass's Straits.

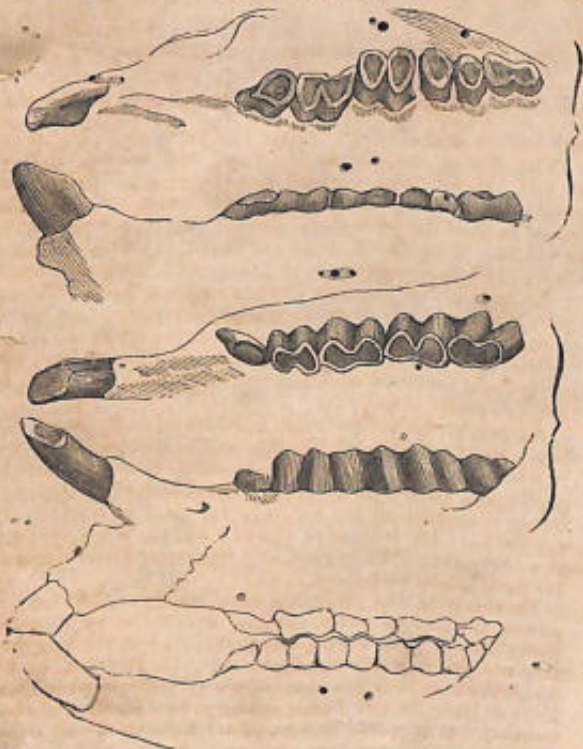
In its general figure this animal is heavy and clumsy : the limbs are short ; the muzzle blunt ; the eyes very small ; the ears short and pointed ; the nostrils widely separated ; the tail a mere tubercle. The feet are broad ; the fore feet have five toes with strong nails for burrowing. The hind feet have also five toes, but the inner is merely a little nailless tubercle. The teeth are formed for grinding roots and other vegetable matters.

Dental formula :—incisors, $\frac{2}{2}$; canines, $\frac{0-0}{0-0}$; molars, $\frac{5-5}{5-5} = 24$. All the teeth are deeply implanted, and hollow at the base. (Fig. 112.)

The fur is moderately long and very coarse, indeed almost bristly ; the general tint is grizzled-brown, or gray mottled with dusky black ; the feet are black ; the under parts of the body dirty-white. The tip of the muzzle is naked. Length of head and body, upwards of three feet. The first account is in Lieut.-Col. Collins's work ('Account of the English Colony in New South Wales,' 1802), where there is an excellent description, an error as regards the dentition of the animal excepted. The details were furnished by Mr. Bass, and drawn up from a specimen obtained at Preservation Island, and sent to the Newcastle museum.

As might be conjectured from its clumsy form and heavy squat proportions, the Wombat is slow and indolent. It lives in burrows, which it excavates to a considerable depth, and in which it quietly reposes during the day, being nocturnal in its habits. Its food is exclusively vegetable. Its temper is placid ; but its intelligence is at a low ratio. When provoked it utters a hissing sound. Its flesh is said to be excellent.

In captivity the Wombat is perfectly contented ; it passes the day in sleep, covered over by straw or other materials ; it feeds during the night, and in the morning resumes its tranquil slumber. Mr. G. Bennett, in his 'Wanderings,' notices one of these animals which was kept at Been, in the Tumat country, in a state of domestication. "It would remain in its habitation till dark ; it would then come out and seek for the milk-vessels, and, should none be uncovered, it would contrive to get off the covers, and bathe itself in the milk, drinking at the same time. It would also enter the little vegetable-garden attached to the station, in search of lettuces, for which it evinced much partiality. If none could be found, it would gnaw the cabbage-stalks without touching



112.—Teeth of Wombat.

the foliage. Although these animals were numerous in the more distant parts of the colony, they are difficult to procure, from the great depth to which they burrow." According to Mr. Bass, though its disposition is gentle, yet it bites and is furious if provoked, and then utters a



113.—Wombat.

low cry between a hissing and a whizzing sound. Mr. Bass chased one of these animals, and lifted it off the ground, carrying it for upwards of a mile, without exhibiting any discomposure, though it was often shifted from arm to arm. When however he proceeded to secure the animal by tying its legs, while he left it in order to cut a specimen of a new wood, it became irritated, whizzed, kicked, and scratched with all its might, and

snapped off a piece of Mr. Bass's jacket with its powerful incisors. The creature, whose temper was now ruffled, continued during all the rest of the way to the boat to kick and struggle, and only ceased from exhaustion. According to the natives, the Wombat among the mountains westward of Port Jackson never comes out of its burrow to feed till night, but in the islands it is seen to feed during all parts of the day. The stomachs of such as Mr. Bass examined were distended with coarse wiry grass, but these specimens were living on the islands; and as such grass is not found in the hilly districts of the mainland, he concludes that the animal lives upon the sorts of vegetable that circumstances present to it. He observed this animal on some occasions among the dry ricks of seaweed thrown up upon the shores, but could never discover what it was in search of. Its pace is a sort of hobble, something like the awkward gait of a bear. There is little doubt but that the Wombat might easily be naturalized in our island and other parts of Europe.

THE ECHIDNA, OR PORCUPINE ANTEATER

(*Echidna Histrix*. *Myrmecophaga aculeata*, Shaw; the Hedgehog of the Colonists at Sydney).

The Echidna constitutes the only known example of the genus which it represents. It is characterized by the utter want of teeth. The body is stout; the limbs are extremely short and thick; the fore paws are compact, and the toes undivided to the claws: these are five in number, large, flat, and blunt; the inner claw is the smallest. The hind feet are directed obliquely backwards, and are furnished with five claws, of which the first is short, and rises like a thumb at the junction of the foot to the limb. The hind limbs of the male are furnished with a sharp stout spur, situated internally on the tarsus. The head is small, the muzzle elongated into a projecting narrow, beak-like snout, cleft transversely by a very small mouth at the apex. The nostrils are above the mouth, minute and oval. The eyes are small and placed low on the sides of the head; the iris is blue.

There are no external ears. The upper surface of the body and also of the short stout tail is covered by a compact mass of thick sharp spines more or less intermingled with coarse hairs. Under ordinary circumstances these spines are directed backwards, converging obliquely to a central line down the back; but they are capable of being elevated, and when attacked the animal rolls itself up like the hedgehog, presenting at all points an array of levelled spears. The limbs and under surface are covered with brown hairs. (Fig. 114.)



114.—Echidna.

As might be inferred from the strength of its limbs and size of its claws, the Echidna is a burrowing animal. Its food consists of ants and their young, which it takes by means of a wormlike tongue capable of being protruded to a great distance. It appears to be nocturnal in its habits. Mr. G. Bennett states that the native names of

the Echidna are 'Nickobejan' and 'Jannocumbine.' It is found in New South Wales, the islands of Bass's Straits, and in Van Diemen's Land. According to the writer last quoted, it inhabits the mountain ranges of Australia, and produces its young in December. It burrows with great celerity, and will even work its way under a pretty strong pavement or base of a wall, removing the stones with its claws. "During these exertions its body is stretched or lengthened to an uncommon degree, and appears very different from the short plump aspect which it bears in its undisturbed state."

The Echidna is eaten by the natives, and is said to taste much like young sucking-pig.



115.—Skull of Echidna.

In the 'Proceed. Zool. Soc. Lond.' for 1834, p. 23, will be found the substance of a note from Lieutenant Breton, respecting an Echidna which lived with him for some time in New Holland, and survived part of the voyage to England. The animal was captured by him on the Blue Mountains, and is now very uncommon in the colony of New South Wales. He regards it as being, for its size, the strongest quadruped in existence. It burrows readily, but he knows not to what depth. Previous to embarkation it was fed on anteggs and milk, and when on board, its diet was egg chopped small, with liver and meat. Its mode of eating was very curious, the tongue being used at some times like that of the chameleon, and at others in the manner in which a mower uses his scythe, the tongue being laterally curled, and the food, as it were, swept into the mouth: there seemed to be an adhesive substance on the tongue by means of which the food was secured. This individual died suddenly, but Lieutenant Breton agrees with MM. Quoy and Gai-

mard in the opinion that with a little care and attention the animal might be brought alive to Europe.

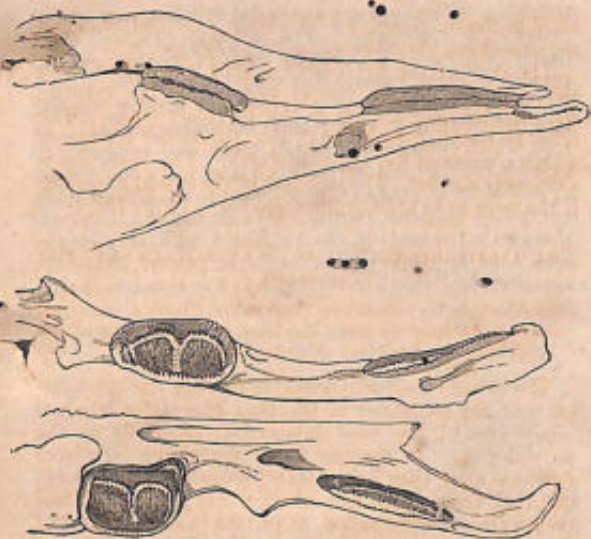
The skull of the Echidna (fig. 115) is remarkable for the convexity of the cranial portion and the extreme prolongation and tenuity of the maxillary bones. The orbit is bounded by an oval rim, the lower portion of which consists of the zygomatic arch. The lower jaw is extremely slender. The structure of the sternal apparatus is the same as in the Ornithorhynchus. (Fig. 130.)

THE ORNITHORHYNCHUS, OR WATER-MOLE OF THE COLONISTS

(*Ornithorhynchus paradoxus*, Blumenb.; *Platypus anatinus*, Shaw; *Mallangong* and *Tambreet* of the natives of the borders of the Yas river, Murrumbidgee, &c.).

The genus *Ornithorhynchus* is perhaps the most singular of any contained in the class *Mammalia*, and certainly one of the most interesting, especially to the physiologist. It contains those remarkable creatures (perhaps more than one species) furnished with a duck-like beak and webbed feet, which would seem, even from their external organization, to partake in some degree of the nature of a bird—creatures, the first discovery of which excited the most lively astonishment.

On looking at the *Ornithorhynchus* we are immediately struck with the configuration of the head. Instead of a muzzle gradually continued as we see in other *Mammalia* generally, it abruptly assumes the appearance of the bill of a duck, being broad, flat, rounded, and covered with a leathery membrane. The outer surface of the upper mandible is grayish black; the palate flesh-coloured; the under mandible paler externally. The edges of both are soft, and the lower, which is the shortest and narrowest of the two, has its edge adapted to a depression under the margin of the upper mandible, which is also channelled with obliquely transverse furrows; those however are merely in the leathery skin. There are no horny laminae as in the bill of the duck. True teeth are wanting; but on each side in either mandible there are



117.—Teeth of Ornithorhynchus.

two horny appendages without roots; one on each side is large and tuberculous, situated on the base of the mandibles, at the posterior part of the mouth; the other forms a long narrow ridge on the anterior part of the mandible along the edge. (Fig. 116.) Capacious cheek-pouches are carried under the skin of the face, from the inside of the mouth, serving as receptacles for food. At the base of the beak, separating between it and the head, there projects a broad loose leathery flap from each mandible, the use of which is probably to defend the eyes and fur of the head from the mud in which the animal grubs, duck-like, in quest of insects. The tongue is short and thick, and covered with long papillæ. The nostrils are two small orifices situated near the apex of the upper

mandible. The eyes are small, but brilliant, and placed rather high in the head. The ears open externally by a simple orifice near the external angle of the eyes, and are capable of being expanded or closed at pleasure.

The fore feet are largely webbed and divided into five toes, terminating in strong blunt burrowing claws. The web which unites the toes is tough and leathery; it extends considerably beyond the claws, and would appear at first sight to act as an impediment to the animal while excavating its long burrow. We do not find, however, that this is the case: it can be folded back at pleasure. The hind feet are smaller and less powerful than the anterior pair: they are divided into five toes armed with



117.—Skeleton of Ornithorhynchus.



118.—Magnified Hind Foot of Female Ornithorhynchus.

sharp claws and webbed, but the membrane is not carried out beyond the roots of the claws. The hind feet are directed backwards as in those of the seal (see skeleton, Fig. 117), and their action is backwards and outwards.

The tarsus of the male is armed with a large sharp moveable spur turned backwards and inwards. It is not used as a weapon of defence, nor are accidental wounds and scratches made by it while struggling in a person's hands attended with ill effects. Formerly this spur was regarded as poisonous. In the female a rudimentary spur may be distinguished. (Fig. 118.)

The body is elongated, low, and depressed: the fur is close and fine, and consists of two sorts, an under layer of soft, short, waterproof wadding, and an outer vest of long fine glossy hair, thickly set, and in many instances assuming a crisped appearance. The tail is strong, broad, flattened, and of moderate length: it is covered



above with longer and coarser hairs than those of the body, but its under surface is only scantily furnished. General colour deep brown; head and under parts paler; a whitish spot in front of each eye; average length of head and body, including tail, twenty to twenty-three inches; beak about two inches and a half; tail, four or five inches. (Fig. 119.)

Essentially aquatic, as is sufficiently declared by its outward structure, the *Ornithorhynchus* passes the active part of its existence almost exclusively in the water. The favourite places of resort of this animal are tranquil parts of rivers with high steep banks, and abounding in waterweeds, among which, and in the oozy mud, are the insects, &c., on which it feeds.

Their burrows (fig. 120) are excavated in the steep banks overhanging the tranquil sheets of water in which they seek their food. These burrows are continued in a serpentine form, rising as they proceed, the termination often being at the distance of fifty feet from the mouth. The entrance is generally larger than the rest of the passage, but the termination is again enlarged, so as to be commodious for the parents and their offspring. The



120.—Burrow of *Ornithorhynchus*.

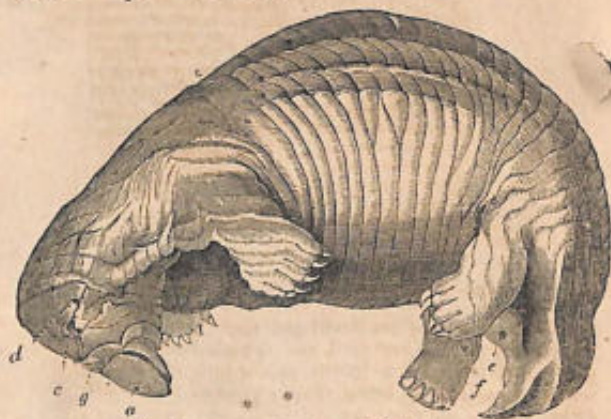
female produces from two to four at a birth, and in the month of November (a summer month in Australia). The young at an early period (immediately after birth, and for some time afterwards) are naked and very small, and their general aspect is very unlike that of the fully developed animal. (Figs. 121 and 122). They are



121.—Smaller Specimen of Young Ornithorhynchus, and Front View of the Mandibles.

curled round, the head and tail being doubled on the abdomen; the skin of the body is thrown into transverse folds; the eyes are merely indicated by the convergence of a few wrinkles on the skin, which passes over these organs, proving that their development does not take place till a considerable time after birth, and, together with the helpless rudimentary condition of the young animal, demonstrating that it is necessarily confined for a long period to the nest in which it is brought forth, and consequently that it does not and cannot follow, as has been conjectured, like a duckling just hatched, its parents to the water. The beak is small, soft, and covered with thin skin. "The margins of the upper mandible are

rounded, smooth, thick, and fleshy; the whole of the under mandible is flexible, and bends down upon the neck when the mouth is attempted to be opened. The tongue, which in the adult is lodged far back in the mouth, advances in the young animal close to the end of the lower mandible; all the increase of the jaws beyond the tip of the tongue, which in the adult gives rise to a form of the mouth so ill calculated for suction or application to a flattened surface, is peculiar to that period, and consequently forms no argument against the fitness of the animal to receive the mammary secretion at an earlier stage of existence." (Prof. Owen.)

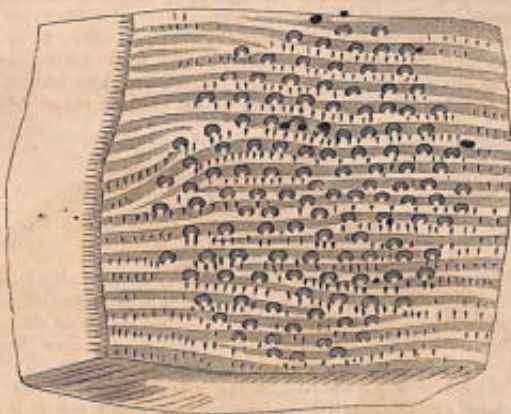


122.—Larger young Specimen of Ornithorhynchus.

That the Ornithorhynchus suckles its young, and possesses a milk-secreting apparatus, are facts which, though once denied, are now incontestably proved.

If the hairs be removed from the abdomen of a female Ornithorhynchus, an areola or oval spot may be distinguished, consisting of a group of ducts, very minute, yet

with orifices larger than those in which the hairs are implanted. (Fig. 123.) The areola varies in extent, and the ducts lead to a large gland beneath the skin, and a thin muscular expansion. This mammary gland is composed of a number of lobes, amounting from one hundred



123.—Magnified View of the Mammary Areola.

and twenty to two hundred, and these are the cells in which the milk is secreted, and which oozes from the ducts, and is received by the soft mouth of the young, which is capable of being closely applied to the areola. (Fig. 124.)

Specimens of two young Ornithorhynchi of different sizes were minutely examined by Professor Owen. The smallest of these rather exceeded two inches in length; the largest was double that size, and was one of the two young ones taken with a mother from a nest, on the banks of the Fish river, by Lieutenant the Honourable Lauderdale Maule, and kept alive for about a fortnight by that gentleman. The stomach of this larger specimen was

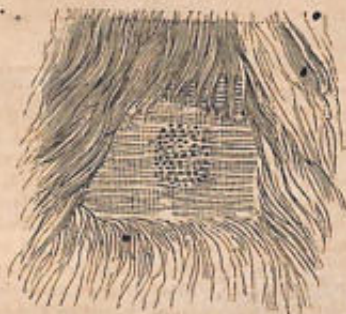


124.—Mammary Gland of *Ornithorhynchus*, reduced below the natural size.

found to be full of coagulated milk. On carefully inspecting the whole contents with a lens, no portion of worms or bread could be detected, which, Mr. Owen observes, solves the doubt entertained by Lieutenant Maule as to whether the mother nourished this young one with the food which was given to her for her support, or with the secretion afterwards discovered to escape from the mammary pores; for the mother having been killed by accident on the fourteenth day after her captivity, it was observed, on skinning her while yet warm, that milk oozed through the fur on the stomach. That it was really milk on the stomach of the young animal Professor Owen demonstrated, and the matter may be considered as fairly set at rest. Another point which seems to be now established is that the *Ornithorhynchus* is ovoviviparous, or, in other words, produces eggs, which, as in the case of the viper and the viviparous lizard (*Zootoca vivipara*, Bell), are hatched just before exclusion, the young being born rudimentary and naked.

Referring to our illustrations, Fig. 125 exhibits a portion of the integument from the abdomen of the *Ornithorhynchus*, with the hairs removed, to show the

mammary areola (Owen, 'Phil. Trans.'). Fig. 123 a magnified view of the mammary areola, showing the orifices of the ducts of the glandular lobules. Fig. 124 shows the mammary lobular gland of the Ornithorhynchus, reduced below the natural size. (Owen, 'Phil. Trans.'). Fig. 122, view of the larger of the specimens of young Ornithorhynchi alluded to: *a*, the nostrils; *c*, the eyes; *d*, the ears; *e*, the vent; *f*, the orifice and rudimentary spur of the hind foot; *g*, membrane at the base of the mandibles. (Owen, 'Zool. Trans.'). Fig. 121, smaller specimen of young Ornithorhynchus, and front view of head: *a*, nostrils; *b*, prominence on upper mandibles; *e*, vent; *f*, orifice and rudimentary spur on hind foot; *c*, the eyes; *d*, the ears; *g*, the membrane at the base of the mandibles; *h*, the tongue. (Owen, 'Zool. Trans.')



123.—Portion of Integument from the Abdomen of Ornithorhynchus.

The ratio in which the development of the young Ornithorhynchus proceeds is not ascertained.

The Ornithorhynchus has never been brought alive to Europe. From the account of Mr. Bennett, who procured and kept several in Australia, it appears to be a lively interesting creature. Its voice, which it utters when alarmed or disturbed, resembles the growl of a puppy, but in a softer key. It dresses its fur, and seems to

126.—*Ornithorhynchus* combing itself.

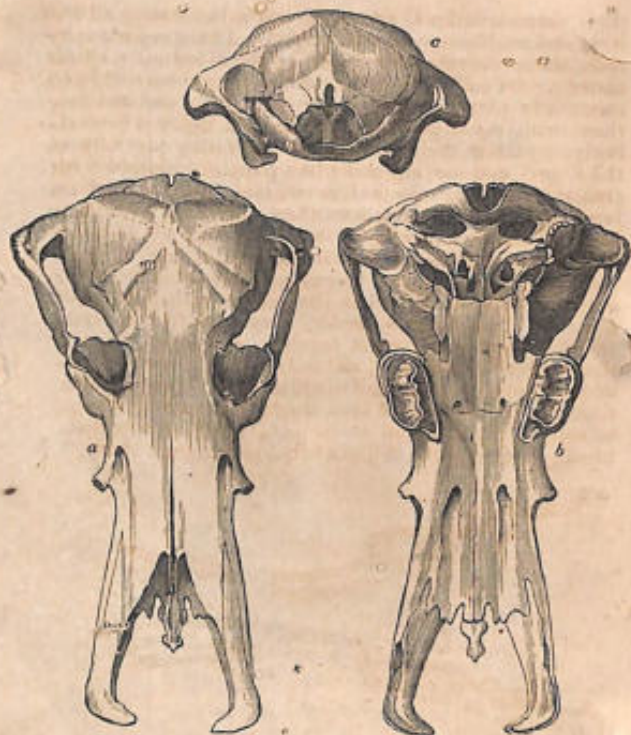
delight in keeping it smooth and clean. (Fig. 126.) The mandibles are endowed with great sensibility. Speaking of a family of these creatures which he obtained, and which lived a considerable time in captivity, Mr. Bennett says, "The young sleep in various postures; sometimes in an extended position, and often rolled up, like a hedgehog, in the form of a ball. (Fig. 127.) They formed an interesting group, lying in various attitudes in the box in which I had placed them, and seeming happy and content. Thus, for instance, one lies curled up like a dog, keeping its back warm with the flattened tail, which is brought over it, while the other lies stretched on its back, the head resting, by way of a pillow, on the body of the old one, which lies on its side, with

the back resting against the box; the "delicate" beak and smooth clean fur of the young contrasting with the rougher and dirtier appearance of the older one; all fast asleep." The gambols of the young Ornithorhynchi are thus detailed: "One evening both the animals came out about dusk, and went as usual and ate food from the saucer, and then commenced playing with one another like two puppies, attacking with their mandibles, and raising their fore paws against each other. In the struggle one would get thrust down, and at the moment



127.—Ornithorhynchus sleeping.

when the spectator would expect it to rise again and renew the combat, it would commence scratching itself, its antagonist looking on and waiting for the sport to be renewed. When running they are exceedingly animated; their little eyes glisten, and the orifices of their ears contract and dilate with rapidity: if taken into the hands at

128.—Skull of *Ornithorhynchus*.

this time for examination, they struggle violently to escape, and their loose integuments make it difficult to retain them. Their eyes being placed so high on the head, they do not see objects well in a straight line, and consequently run against everything in the room during

their perambulations, spreading confusion among all the light and readily-overturnable articles. I have occasionally seen them elevate the head, as if to regard objects above or around them. Sometimes I have been able to enter into play with them by scratching and tickling them with my finger; they seemed to enjoy it exceedingly, opening their mandibles, and biting playfully at the finger, and moving about like puppies indulged with similar treatment. As well as combing their fur to clean it when wet, I have also seen them peck at it with their beak (if the term may be allowed) as a *duck* would clean its feathers. When I placed them in a pan of deep water, they were eager to get out after being there for only a short time; but when the water was shallow, with a turf of grass in one corner, they enjoyed it exceedingly. They would sport together, attacking one another with their mandibles, and roll over in the water in the midst of their gambols, and would afterwards retire, when tired, to the turf, where they would lie combing themselves. They appeared to be in a great measure nocturnal, preferring the twilight to the bright glare of day."



129.—Lower Jaw of Ornithorhynchus, seen from below.

In fig. 128 the skull of the Ornithorhynchus is represented in different aspects: *a*, as seen from above; *b*, as seen from below; *c*, as seen from behind. The upper figure is that of the under jaw. The skull is

remarkable for the flattened and elongated form of the bones of the facial portion; the intermaxillary bones, which are, as it were, let into projecting maxillaries, diverge, leaving a vast opening (the foramen incisivum). The cranial cavity is considerable; the orbits are small; the zygomatic arch slender and compressed. The suborbital foramen appears on the edge of the upper mandible, its situation being marked by a projection of the bone. The lower jaw is slender and depressed; there are no coronoid processes; the outer sides of the ascending rami (though very narrow) have, as in most, if, indeed, not all the Marsupials, a pit-like cavity for the lodgment of the masseter muscle. The extent of the temporal muscle is trifling. (Fig. 129.) The skull of the Ornithorhynchus can be confounded with that of no other animal.



130.—Sternal Apparatus of Ornithorhynchus.

With respect to the sternal apparatus, to which we alluded in our account of the Echidna, it appears to be formed more after the model of that of the Saurian reptiles, than after that of Mammalia. (Fig. 130.)

The general colour of the gnu is deep umber-brown verging upon black; the tail and mane are gray; the latter indeed is nearly white. (Fig. 118.) Fig. 119 represents a front view of the head of the animal, which may be compared with the characters we have detailed. Besides the common gnu, two other species of this genus are known. The first is the Kokoon, as the Booshwanas term it (*A. taurina*, Burchell). It is larger than the preceding species, with which, though inhabiting the same districts, it never associates; it is far less daring than the gnu, and is sometimes found solitary, but most frequently in herds, which wander over the vast plains of the interior.



119.—Head of Gnu.

The next species is the brindled gnu (*A. Gorgon*, H. Smith): little is known respecting it, and it appears to be comparatively rare, and is perhaps restricted to certain territories beyond which it does not wander.

A specimen exists in the Museum of the London Missionary Society, which was brought from South Africa. It is certainly very distinct from either of the preceding animals.

So far then have we endeavoured to give a sketch of the Antelopes, a family which, as it usually stands in systematic works, consists of a number of distinct forms or genera, ill-assorted under one head, and exhibiting

very different degrees of relationship to each other. When we compare the Canna on the one side, and the Pronghorn on the other, with the Gazelle of the desert, we see few points of affinity, and are forced to the conviction that the division-line between the family "Antelope" of most writers, and that of the ox and the goat, is purely arbitrary. Our object has been, without departing from our plan of clothing science in a popular dress, to convey some idea of the principal groups into which the Antelopes are resolvable, and to delineate succinctly the habits and manners pervading each group, or displayed by the more remarkable species. Though we have given generic titles and definitions, yet we have used the term "Antelope" throughout, in the specific name of each animal, as being more familiar to general readers than such words as *Catoblepas*, the title of the genus comprehending the gnu; *Calliope*, that of the koodoo, &c.; deeming it sufficient to have stated them, and noted their characters at the head of each genus. Those who wish to investigate this subject at length, may consult Col. Hamilton Smith's 'Treatise on the Ruminants,' in Griffith's translation of the 'Règne Animal' of Cuvier; and a paper by Mr. Ogilby, in the 'Zool. Proceeds.' for 1836, p. 132, et seq.

GOATS AND SHEEP.

Though the domestic races of goats and sheep, as we are accustomed to see them in Europe, exhibit marked distinctive features, yet the diagnostics fail us in a great measure when we turn to the breeds of sheep in other countries, which exhibit a greater length of limb, a more goat-like form of body, and a clothing of hair; and it is from paying attention to domestic breeds, rather than to truly wild species, that naturalists have been inclined to consider both goats and sheep as generically the same, seeing that it is for the most part in countries where the domestic sheep is woolly that its difference from the goat is at once palpable. "So little," says Cuvier, "do the sheep deserve to be generically separated from the

goats, that they even produce together a mixed fertile race," an assertion we query. Again, in the 'Zool. Proceeds.' 1834, Mr. Hodgson, after a long table of differences between sheep and goats, adds, "After all, there are no physical distinctions at all equivalent to the moral ones (those deduced from temper and disposition of the two species) so finely and truly delineated by Buffon, and which, notwithstanding all that Col. Hamilton Smith urges in favour of the courage and activity of the sheep, will even be recognised as the only essential diagnostics of the two genera." If there are, indeed, no other distinctions, the "moral ones" are nothing, for the wild species of goat and sheep are not so contrasted in disposition; and even if they were, it is not from such points that the naturalist has to deduce generic characters.

In the goats, and also in the sheep, there are horns in both sexes; there are also glandular interdigital pits in the sheep and goat, and they are alike formed for rocky or mountain abodes; the muzzle is small and hairy. The females have two teats. The goats have the horns compressed laterally, rugose on their anterior aspect, and arching upwards and backwards; there is no suborbital sinus. The sheep have the horns voluminous, turned to the sides, curling downwards, and often making a double flexure. There are deep suborbital sinuses, with a linear orifice incapable of being expanded, and, unless sought for, not to be seen amidst the wool or dense hair. Besides these characters, the chaffron is generally more arched in the sheep than the goat; and the latter has mostly the lower jaw furnished with a beard. Neither have inguinal pores.

GENUS *CAPRA*—THE GOATS.

THE COMMON GOAT (*Capra Hircus*, Linn.).

Αἴξ (ὁ καὶ ἡ, but generally used for the female), τράγος, χίμαρος (the male), ἔριφος (young male kid of three or four months), χίμαρα (young female before its first winter), of the Greeks; Caper and Hircus (male), *Capra*

(female), Hædus, or Hædus (a young male kid), Hædulus, or Hædillus (a very young male kid, or kidling, (ἄριφος), Capella (female kid), of the ancient Italians; Becco (male), Capra (female), Capretto, and Capretino (kid and kidling), of the modern Italians; Bouc (male), Chèvre (female), Chevreau (kid), of the French; Cabron (male), Cabra (female), Cabrito (kid), of the Spanish; Cabram (male), Cabra (female), Cabrito (kid), of the Portuguese; Bock (male), Geisz (female), Bocklein (kid), of the Germans; Bok (male), Geit (female), of the Dutch; Bock (male), Geet (female), Kùdh (kid), of the Swedes; Buk, Geedebuk (male), Geed (female), Kid (kid), of the Danes; Bwch (male), Gafr (female), Mynn (kid), of the antient Britons. (Fig. 120.)



120.—Common Goat.

As is the case with almost every domesticated quadruped, great uncertainty hangs over the origin of the goat. Some naturalists refer it to the Ibex of the European mountain-ranges, others regard it as descended from the Paseng of Persia (*Capra Ægagrus*) or from

the Caucasian Ibex (*Capra Caucasica*, Gldenst.), Cuvier says that the Ibex of the European Alps, as well as that of the Caucasus, breeds freely with the common goat, producing a fertile progeny; and there were in the Garden of Plants at Paris goats of very large stature,* taken wild on the Alps and Pyrenees, the produce, as asserted, of the Ibex with the common goat. After all, however, nothing positive can be ascertained on the point in question; it is one of those which must be left in abeyance. The subjugation of the goat, whatever may be its primitive stock, took place at a very early epoch, and it is evident that the flesh of the kid was accounted a delicacy. There was formerly in Syria, as there is at the present day, a breed of goats with long pendent ears, and fine long hair fit for the manufacture of some kinds of stuffs. In this respect they perhaps resembled the Angora goat (Angora is in Anatolia, Asiatic Turkey). We read that the Israelites made curtains of goats' hair as a covering for the Tabernacle, and the modern Arabs manufacture the cloth of their tents from the hair of the long-eared breed, which is generally of a black colour, and which they prefer to the hair of the camel. The females of this breed yield excellent milk in profuse quantity, and are therefore much esteemed. Burckhardt notices a very fine breed of goats of this race in the valley of Baalbec, which he says are not common in other parts of Syria; they have very long ears, large horns, and long hair, but not silky like that of the goats of Anatolia. The hair of the goats of Italy in the time of Virgil was long, but of coarse quality. In the 'Georgics' (lib. iii.) the shepherds are directed to shear the beards and long hair of the Cinyphian goats for the service of the camp, and for garments for the mariner. Varro also observes that goats were shorn for the use of sailors, for coverings to engines of war, and to workmen's instruments. From the earliest antiquity the milk of the goat has been in requisition, and in the present day the goat and sheep in Syria take the place of the cow, if not exclusively, to a great extent.

From the beginning of April to the beginning of



121.—Long-eared Syrian Goat.

September, the towns are supplied with milk by large herds of goats, which pass through the streets every morning, and are milked before the houses of the customers. The products of the milk are furnished in abundance at the same season. In Switzerland, flocks of goats are kept for the sake of their milk, and our classical reader will remember the lines in Virgil (*'Georgics,'* lib. iii.) which are still applicable, "*Pascuntur vero sylvas,*" &c. Besides the long-eared and long-haired race of Syria, of which Fig. 121 is a representation, there is also a breed closely resembling that common in Europe: among other races we may here notice the Dwarf African, with close hair, almost beardless, and with a little pendulous tassel-like excrescence of skin hanging from each side of the throat: of this breed we have seen specimens in England.

The most celebrated variety of the domestic race is the goat of Cashmir (Fig. 122), which produces a wool of exquisite fineness, from which are manufactured the costly Cashmir shawls, not to be purchased even in the country where they are wrought but at a great price. This goat is spread through Thibet, and in the country of the Kirghiz, at the bend of the Ural north of the Caspian Sea; it is covered with silky hair, long, fine, flat and falling, and with an under-vest, in winter, of delicate grayish wool; and it is this wool which constitutes the fabric of the shawls. The average weight of wool produced by a single goat is about three ounces, and it sells in Thibet for about five shillings a pound: ten goats are required to furnish sufficient wool for a shawl a yard and a half square. It appears that in Thibet the wool is first combed from the goats in the mountains and sent to Cashmir, where it pays a duty on entry. It is there bleached with rice-flour, spun into thread, and taken to the bazaar, where another tax is paid upon it; the thread is then dyed, and the shawl is woven and the border sewed on; but the weaver has now to carry it to the custom-house, where a collector puts on it any tax he pleases, and in this he is only limited by the fear of ruining the weaver, and consequently losing future profit.



122—Cashmir Goat.

All the shawls intended for Europe are packed up and sent to Peshawur across the Indus; this part of the journey is generally performed upon men's backs, for the road is in many parts impassable, even by mules, being across deep precipices, which must be traversed by swinging bridges of ropes, and perpendicular rocks, which are climbed by wooden ladders. At each station of this toilsome journey, which lasts twenty days, a tax is paid, amounting to about two pounds sterling for the whole journey. From this point till they come near the confines of Europe, in addition to the many custom-houses at which they must pay tribute, these valued articles of merchandise are exposed to the marauders of Afghanistan and Persia, and to the Turkomanic hordes, whose forbearance must be purchased at a high price. After leaving Persia, many shawls get to Europe over the Caucasus, and through Russia, but the largest number reach Constantinople through the Turkish provinces.

In April, 1819, M. Jaubert, under the French government, succeeded in bringing a flock of Thibet goats, with great loss and difficulty, from the Kirghiz territory to France. Monsieur Jaubert left Paris in April, 1818, and proceeded towards Asia, through Southern Russia, by Odessa, Taganrog, and Astrakhan. On his way he received much information from merchants of Bukharia and Armenia, and ascertained that a handsome race of goats with brilliant white fleeces was to be found among the Kirghiz tribes, who wander in the plains partly surrounded by the great bend of the river Ural or Yaik, which divides Europe from Asia. Samples of the down from these animals were shown him, and he found locks of it scattered here and there in parts of the steppes between Astrakhan and Orenburg, which convinced him that he was in the track of the genuine shawl-goat; this was further corroborated by the designation of *Tibet*, by which name the animal was known to the native tribes. He soon found large flocks of the goats in possession of the Kirghiz, and of them he purchased nearly thirteen hundred, with which he prepared to retrace his steps. The home journey across the plains of Russia appears to have been injudiciously timed; it was begun at the setting in of winter; the goats crossed the Volga at Tsaritsin, nearly 300 miles above Astrakhan, and proceeded to Taganrog, where it was intended to embark them; but, as might have been expected, the sea was frozen, and it was found necessary to drive them on to Caffa, which they reached on the 24th of December, nearly 300 of their number having died by the way of cold and fatigue.

At Caffa the flock was divided into two portions: one of these, consisting of 566 goats, was put on board a Russian vessel, which arrived at Marseilles about the middle of April, 1819; the remainder embarked on board another vessel with Monsieur Jaubert himself, and reached Toulon towards the end of April. No further account has reached us of this latter portion of the flock, but ample details concerning the division which landed at Marseilles have been given by monsieur Tessier, who

was commissioned to receive the animals as soon as they should leave the lazaretto, where they were shut up on landing, according to the quarantine regulations. M. Tessier found the poor creatures in a wretched state; they had been packed together in the hold of the vessel, where no fresh air ever reached them; and the space they had to move in was less than the length of their bodies. This treatment had produced disease in almost all the flock; the hair was dropping from them, and it was found necessary to shear off what remained. They also suffered from convulsions; but the most fatal malady with which they were attacked was a tubercular consumption, from which great numbers perished. A close lazaretto was not calculated to remove the complaint, and many deaths took place daily during the thirty days they were confined. "We have saved but very few," says M. Tessier, "and only such as had slight attacks; the remedy employed was flour of brimstone mixed with their food."

The animals that escaped these multiplied ills were soon removed to more congenial situations; some were placed in the royal bergerie near Perpignan, at the foot of the Pyrenees, some in the hilly country about Toulon, and others farther to the west in the departments near the Rhone. The whole number surviving of both flocks when Monsieur Tessier wrote his account (August) was about 400; they were then generally in good health, their hair had grown to a considerable length, and the valuable down had begun to show itself.

The shawl-goat was thus naturalized; and subsequent experience has shown that the down produced in Europe is not inferior to that of the original Thibet stock. Fears were at first entertained that this could not be the case; it was said that the breed obtained was not pure, that it had degenerated; and a letter from Moorcroft, written in the beginning of 1822, at Ladakh in Thibet, seemed to confirm the suspicion. He says, "France has, I learn, procured a flock from some of the steppes near the Caspian, which must be inferior to those of Thibet, as lately Aga Aabdi was employe'd by Russia itself to procure the

breed from the borders of Chinese Turkestan. But these fears were unfounded. The small produce of wool, however, obtained from each animal not averaging more than three ounces, precluded all hope of making a profit by rearing these animals, and the scheme would have failed had it not occurred to M. Polonceau that a cross between the Thibet and Angora goat, remarkable for the length and silkiness of its hair, might be an improvement on both. The experiment was tried, and succeeded; and instead of three ounces, several of the mixed race produced thirty ounces of down in one season, and of a superior quality, being of finer and longer staple, while the animals themselves were more hardy and docile.

In 1824 some of the pure Thibet goats were imported from France into England by Mr. Towers, and located at Weald Hall, Essex; but their limited produce militated against the extension of the breed with advantage. In 1831 Mr. Riley, an enterprising proprietor of New South Wales, purchased from M. Polonceau ten females and three males, which he conveyed safely to London, and thence to New South Wales; but with what ultimate results we are not able to state.

To describe the common goat is superfluous; its habits, its boldness, and its activity are well known. It climbs rocks and rugged mountains with great agility, and will stand secure wherever it can manage to get the most limited footing. In Egypt and Syria goats are often taught various feats of dexterity, for the performance of which their natural address and activity peculiarly qualify them, but to execute which, nevertheless, requires considerable practice. Dr. Clarke, in his 'Travels' (vol. ii.), notices an instance of this kind, which he describes as follows:—"Upon our road we met an Arab with a goat, which he led about the country for exhibition, in order to gain a livelihood for itself and owner. He had taught this animal, while he accompanied its movements with a song, to mount upon little cylindrical blocks of wood, placed successively one above the other, and in shape resembling the dice-boxes belonging to a backgammon table. In this manner the goat stood, first



123.—Arab and Goat.

upon the top of one cylinder, then upon the top of two, and afterwards of three, four, five, and six, until it remained balanced upon the top of them all, elevated several feet from the ground, and with its four feet collected upon a single point, without throwing down the disjointed fabric upon which it stood. The practice is very ancient. It is also noticed by Sandys. Nothing can show more strikingly the tenacious footing possessed by this quadruped upon the jutting points and crags of rocks; and the circumstance of its ability to remain thus poised may render its appearance less surprising, as it is sometimes seen in the Alps, and in all mountainous countries, with hardly any place for its feet, upon the sides and by the brink of most tremendous precipices. The diameter of the upper cylinder, on which its feet ultimately remained until the Arab had ended his ditty, was only two inches, and the length of each cylinder was six inches." Fig. 123 represents this performance.

The period of gestation with the goat is five months, and the female usually produces two, sometimes three young at a birth.

The use of the goat in England, compared with other countries, is very limited; the demand for its milk is only occasional, and the flesh even of the kid is not in much request. Few stable-yards, however, are without a goat or two, the peculiar odour of the animal (especially strong in the male) being supposed to be both salutary and grateful to horses. While doubting this, we can well imagine that the presence of the active, familiar, and playful goat may not be unproductive of benefit to the horse confined in his stall, as the latter, like most animals, delights in society, and instances of attachment between goats and horses are far from being uncommon.

From the domestic goat we must pass to consider some of its wild representatives.

THE IBEX, BOUQUETIN, OR STEINBOCK (*Capra Ibex*).

This bold and powerful animal, armed with huge sweeping horns, inhabits the alpine heights of Europe and Western Asia. It associates in small troops, consisting of a male and a few females. The horns of the male curve boldly over the back, their anterior surface presenting a series of regular protuberances or partial rings: their length is often three feet. In the female they are smaller. The hair of the Ibex in summer is short and close, in winter long and thick: its colour is yellowish gray, a black streak extending along the spine; the croup is white, as are also the under parts of the body, a dark tint abruptly dividing the white from the general colour above. The chin is bearded. The Ibex stands two feet six or eight inches in height, and is extremely active and vigorous. (Fig. 124.) The chase of the Ibex is as arduous as that of the chamois, the animal leading its pursuer, unless he can steal upon it unawares with his rifle, a dangerous track over steep and rugged mountain pinnacles, along the brink of precipices, and over fearful chasms: when at last hard pressed, the



124.—Ibex.

Ibex will often turn upon its foe with impetuous rapidity, and hurl him headlong down the steep rocks or abrupt precipice.

The Ibex is vigilant and wary; and it is only during the night that it descends to pasture in the woods, but at sunrise again repairs to the bleak mountain summits. Like the chamois, it is satisfied with frugal fare and a scanty supply of water. It is said that the old males seek more elevated spots than the females and younger males, which are more easily to be obtained. The only sound which the animal makes is a short whistle, and when irritated, a snorting noise. In Europe its favourite

haunts are the Alps, the Apennines, the Pyrenees, and the mountains of Tyrol. In Asia it is found in the mountain chain of the Taurus.

THE PASENG (*Capra Ægagrus*).

The Paseng is found in the mountains which traverse the north of Persia and India as far as China, and especially the Caucasian chain and that of Taurus. It is



known to the Turkomans, Kirghiz, and other nomadic people to the north of Persia, and also to the natives of the Persian provinces at the southern base of the mountains. The Paseng exceeds the largest domestic goat in size, and is very strong and active, precisely resembling the Ibex in habits and manners. The general colour is gray, shaded with rusty brown: the forehead is blackish brown, whence a line of the same colour extends down the spine, crossed by a similar band over the withers; the beard is long and of a dark brown, which is the colour of the limbs; a white patch occupies the crupper. The horns of the male are very large, compressed, and slightly diverging as they arch backwards; their anterior edge is narrow, and marked by a series of protuberances with deep notches between. (Fig. 125.)

A species of Ibex, distinct, it is believed, from the European, inhabits the Caucasian range, and especially the neighbourhood of the sources of the rivers Terek and Caban. It is the *Capra Caucasica* of Gldenstern. (Fig. 126.)

Rppel, in his 'Zoological Atlas,' describes and figures an Ibex from the mountains of Abyssinia, under the native name of Walie (*Capra Walie*, Rpp.). It is of a dark yellowish umber, the under surface and inside of the limbs being white.

Another distinct species is the Jemlah Ibex, described by Col. H. Smith (*Capra Jemlaica*), with horns peculiarly massive at the base. It is an inhabitant of the range of the Himalaya mountains. This species would appear to be the Jhral of Mr. Hodgson. Its height is thirty-three inches; the head is finely formed, full of beauty and expression, clad in close short hair, and without the least vestige of a beard. The Jhral is of compact and powerful make, with a spare, short, and bowed neck; deep barrel and chest; longish, very strong and rigid limbs, supported on perpendicular pasterns and high compact hoofs. The fur is of two sorts, an outer coat of straight and somewhat harsh hair, and an inner vest of soft fine wool. The fore-quarters are superb, and wholly invested in a long, flowing, straight, lion-like

126.—Ibex (*Capra Caucasica*).

mane, feathered vertically from the top of the withers and sweeping down below the knees. The horns are nine inches long, subtriangular, wrinkled across, and gently recurved. The colour is deep brown superficially, but under the outer coat hoary blue, which is the prevailing tint of the mane; chin and lips hoary, with a blackish mark below the angle of the mouth. This fine species is found in the Kâchar region of Nepâl, solitary or in small herds: it is bold, capricious, active, and pugnacious, but easily tamed, and breeds, as does the ibex, with the common goat. (See 'Proceeds. Zool. Soc.' 1834, p. 106.) Mr. Hodgson considers it distinct from the *C. Jemlaica*, and terms it *C. Jhâral*.

An ibex from Nubia and Arabia is described by Fred. Cuvier, under the title of *Capra Nubiana*. It is more slightly built than the common ibex, with slender elongated horns two and a half feet in length. A specimen

is preserved in the museum of the Zoological Society, London. How far the species of ibex we have noticed are truly distinct from each other, or mere varieties resulting from climate and other causes, we will not attempt to decide. It is perhaps the Caucasian ibex that exists in Palestine, Edom, and Sinai, and which is stated closely to resemble the ibex or bouquetin of the Alps. It is called in Arabic *Beden* and *Táytal*. The former appellation is exclusively applied to the male, which is readily distinguished by a beard and large knotted horns curving backwards over the body. The horns of the female are very much smaller, scarcely exceeding in size those of the gazelle.

THE Aoudad

(*Capra Tragelaphus*; *Ovis Tragelaphus*, Pallas; *Ammotragus Tragelaphus*, Blyth, in 'Zool. Proceeds.' 1840, p. 78).

This species is in some respects intermediate between the goat and sheep, with which latter it is associated in most systematic works. It differs from the sheep in having a concave chaffron, and in the absence of suborbital sinuses, but in the form of its horns it resembles them more than it does the ibex or wild goat. These horns are stout, subquadrangular, and ringed; they diverge more laterally than those of goats in general, and curl as in the sheep. There is no beard, but a pendent mane of long coarse hairs begins under the lower jaw, and runs along the under side of the neck and chest. The fore-legs above the knee are also covered with long hair, which hangs round the leg below the knee like a ruffle, whence the French term this species "*mouflon à manchettes*." The rest of the body is clothed with short hair; the general colour is dull yellowish brown. The male attains a large size, exceeding a fallow-deer, and measuring more than three feet at the shoulder. The horns are sometimes two feet in length following the curve. The female is a third smaller than the male. (Fig. 127.)



127.—Aoudad, or Kebesch.

The Aoudad, as it is called by the Moors of Barbary, is found in Sinai, and in the mountains which border the Nile to Ethiopia and Abyssinia. In Egypt it is termed Kebesch by the modern Arabians. It is also spread throughout the whole of North Africa, above 18° , frequenting in small families the steepest and most inaccessible crags. It is abundant in the range of the Atlas, tenanted the woods at a high elevation, and the precipitous rugged heights usually clothed with forests at their base. The Aoudad is wonderfully agile, and leaps with amazing precision to great distances, from ledge to ledge,

and from point to point, over the most elevated ridges. The old ones are not unfrequently shot by the Moors of Tunis, Tripoli, and other places, and the young are occasionally captured alive. It is, however, very rarely seen in European menageries. A female some years existed in the gardens of the Zoological Society, London, and is the only one we have ever had the opportunity of examining alive. Fine preserved specimens are both in the British Museum and that of the Zoological Society, London. This species is clearly delineated on the monuments of ancient Egypt.

GENUS OVIS.—SHEEP.

Of all our domestic animals, the sheep is that of which we have the earliest notice: "Abel was a keeper of sheep." It was reclaimed in the primordial era of man's existence on the globe, and we must look to Western Asia as its original habitat. From this centre it has more or less gradually spread by the agency of man, and, influenced by climate, food, and treatment, has ramified into numerous varieties. Naturalists have amused themselves with conjectures as to the wild stock whence the domestic sheep has descended; some asserting the Mouflon of Crete, Corsica, and the islands of the Grecian Archipelago to be its origin; others the Argali of Siberia: others, again, that the European sheep are the descendants of the Mouflon, the Asiatic of the Argali. Mr. Blyth considers it likely "that more than one wild species have commingled to form the numerous domestic races," though, as he adds, certainly none as yet described; and though so many decidedly distinct wild species have been added to the genus, we are far from having ascertained the complete number existing, several more yet remaining to be discovered, upon the lofty table-lands and snowy mountains of Middle Asia, from the Caucasus and Taurus to the Altai; and among them it is probable there may be some much more nearly allied to the domestic races than any at present known. He believes that a wild sheep or Argali in central Persia,

noticed by Sir John MacNeill, will prove upon further investigation to be the wild stock, or one at least of the wild stocks of the domestic sheep. This wild Persian species is at present undescribed. When we consider that for several thousand years the domestic sheep has been subject to man, and undergone many modifications, we cannot help doubting as to the recognition of its primitive type; nay, we even doubt whether that type be extant. Hector Boethius describes a wild breed of sheep in the island of St. Kilda exceeding the largest goat in size, with heavy massive horns, longer than those of the ox, and as bulky, and with a tail hanging to the ground. Skulls of sheep, perhaps belonging to this race, occur in peat-bogs; two of these crania, one probably that of a male, the other of a female, which were



128.—Head of Aramenian Argali.

Obtained in Ireland from the peat, were some time since exhibited to the Geological Society. Pennant remarks that such an animal as Boethius has described is figured on a bas-relief taken out of the wall of Antoninus near Glasgow. These animals, whether they ever existed or not, were distinct not only from the Mouflon of Corsica,



129.—Mouflon of Corsica.

but from any other of the wild species as far as we know them.

In the 'Zool. Proceeds.' 1840, is a paper by Mr. Blyth, entitled 'An amended list of the genus *Ovis*,' which is too full of information to be altogether passed over. We may premise by observing that Fig. 128 is a sketch of the head of the Armenian Argali (*Ovis Gmelinii*, Blyth); Figs. 129 and 130 are drawings of the Mouflon of Corsica (*Ovis Musimon*).

The species (granting that they are all distinct from

each other) enumerated by Mr. Blyth are the following, some of which are new to science :—

The Pamir sheep, or Rass (*Ovis Poli*, Blyth). “ In the narrative of the celebrated Venetian traveller Marco Polo, we read that upon the elevated plain of Pamir, eastward of Bokhara, and 16,000 feet above the sea-level, wild animals are met with in great numbers, particularly sheep of a large size, having horns three, four, and even six palms in length. The shepherds form ladles and vessels from them for holding their victuals. They also construct fences for enclosing their cattle and securing them against the wolves, and which likewise destroy many of the wild sheep. More recently an animal called the Rasse was indicated, from report, in Sir A. Burnes’s ‘Travels in Bokhara,’ and its horns have been since transmitted to the Royal Asiatic Society, by Lieut. Wood, of Sir A. Burnes’s party, through the medium of



130.—Mouflon of Corsica.

G. I. Vigne, Esq." This pair of horns was labelled Rass or Roosh. Sir A. Burnes writes: "I have heard of an animal called Ross by the Kirghises, and Kooshgar by the natives of the low countries; but Lieut. Wood, in the narrative of his recent journey to the source of the Oxus, distinguishes between the Rass and the Kutchgar, the former having straight spiral horns, and its dun-colour being of a reddish tinge. Both are said to be peculiar to the Pamir. The same writer, speaking of the Kutchgar, says it was a noble animal, standing as high as a two-year old colt, with a venerable beard, and two splendid curling horns, which, with the head, were so heavy as to require considerable exertion to lift them. Though poor in condition, the carcass divested of its offal was a load for a baggage pony. The Kutchgar is gregarious, congregating in herds of several hundreds; they are of a dun-colour." This traveller confirms Marco Polo's narrative: "We saw," he writes, "numbers of the horns strewed about in every direction, the spoils of the Kirghise hunter." "The ends of the horns, projecting over the snow, often indicated the direction of the road, and wherever they were heaped in large quantities, there our escort recognised the site of a Kirghise encampment." The flesh is much prized by these people, who shoot it (the animal) with arrows. "The Rass is said to delight in the coldest districts; a common-sized individual will require two horses to bear its flesh from the field." The horns, following their curvature, are nearly five feet in length. It would appear that the Kutchgar has yet to be added to the list of species.

The Siberian Argali (*Ovis Ammon*).—This noble sheep is described by Pallas.

The Kamtchatkan Argali (*Ovis nivicola*).—M. Eschscholtz, who describes this species, states it to be very numerous on the mountains of Kamtchatka; in summer it resides upon the snow-clad heights, but in winter it descends to the lower regions. Kotzebue notices its agility.

America presents us with two species very closely allied to the Siberian Argali—the Rocky-Mountain Ar-

gali (*Ovis montana*), and the Californian Argali (*O. Californiana*, Douglas). The Rocky Mountain sheep inhabit the Rocky Mountain range of North America, and, as most suppose, were first discovered by the Fathers Piccolo and de Salvatierra, when, in 1697, they established the first mission in California, nearly two centuries after the first discovery of that country.

"We found," observes Father Piccolo, "two sorts of deer, that we know nothing of; we call them sheep, because they somewhat resemble ours in make. The first sort is as large as a calf of one or two years old; its head is much like that of a stag, and its horns, which are very large, are like those of a ram; its tail and hair are speckled, and shorter than a stag's; but its hoof is large and round and cleft, as an ox's. I have eaten of these beasts; their flesh is very tender and delicious. The other sort of sheep, some of which are white, and others black, differ less from ours. They are large, and have a great deal more wool, which is very good, and easy to be spun and wrought." Dr. Richardson, in reference to the above notice, observes,—“Hernandez, Clavigiero, and other writers on California, likewise mention these animals; and Vanegas has given a figure of the first-mentioned one, which has, though evidently on insufficient grounds, been considered to be the same with the Siberian argali, while the one noticed in the latter part of the quotation has been referred to the species described under the name of Rocky Mountain goat. The speckled hair does not agree with any descriptions I have met with of the Rocky Mountain sheep; nor have I heard that black individuals are ever met with in the herds of the Rocky Mountain goat. It is therefore probable that the Californian animals are different from the allied ones which inhabit the more northern parts of the Rocky Mountain ridge. Mr. David Douglas describes Piccolo's sheep under the name of *Ovis Californica*. Pennant, who considers the Asiatic argali (*O. Ammon*) and the Corsican mufro (*O. Musimon*) to be varieties of the same species, says, in 'Arctic Zoology,' that the argali is suspected to be found in California, but not on the best

authorities." We cannot, however, but think that the Rocky Mountain sheep was the animal indicated by Piccolo, nor is the vague term *speckled* any formidable obstacle. The colour of the fur of this animal, which is of a dusky brownish hue, resides in the ends of the hair, and as these are rubbed off during the progress of the winter, the tints become paler, some hairs being worn more than others, giving somewhat of a grizzled appearance, which becomes paler and paler, till in the old rams the coat in spring is almost pure white. That grizzled appearance, or the patches caused by the greater abrasion of the hair in one place more than another, might suffice to lead a person writing loosely, and no naturalist, to call the animal speckled.

Though skins of the Rocky Mountain sheep were brought by Captain Cook from the north-west coast of America, and also imported by the North-West Fur Company, it was not until 1803 that the attention of naturalists was drawn towards the animal by a paper published in the 'Medical Repository of New York,' by Mr. M'Gillivray, who had previously procured skins on the mountains in which the Elk river takes its rise, whence others also have since been procured; as well as from the mountains skirting the south bank of the Mackenzie. From one of the specimens procured by Mr. M'Gillivray, which was first deposited in the New York Museum, and afterwards sent to France, M. Geoffroy published a figure and description in the *Annales du Muséum*, entitling the animal "*Bélier sauvage d'Amérique*." A fine male and female specimen exist in the museum of the Zoological Society; these were obtained by Dr. Richardson, on the banks of the Mackenzie. From this naturalist we borrow the best description of the habits of this animal which we have yet seen:—

"The Rocky Mountain sheep inhabit the lofty chain of mountains from whence they derive their name, from its northern termination in lat. 68° to about lat. 40° , and most likely still farther south. They also frequent the elevated and craggy ridges, with which the country between the great mountain range and the Pacific is inter-

sected; but they do not appear to have advanced farther to the eastward than the declivity of the Rocky Mountains, nor are they found in any of the hilly tracts nearer to Hudson's Bay. They collect in flocks consisting of from three to thirty; the young rams and the females herding together during the winter and spring, while the old rams form separate flocks, except during the month of December. The ewes bring forth in June or July, and then retire with their lambs to the most inaccessible heights. Mr. Drummond informs me that in the retired parts of the mountains, where the hunters had seldom penetrated, he found no difficulty in approaching the Rocky Mountain sheep, which there exhibited the simplicity of character so remarkable in the domestic species; but that where they had been often fired at they were exceedingly wild, alarmed their companions on the approach of danger by a hissing noise, and scaled the rocks with a speed and agility that baffled pursuit. He lost several that he had mortally wounded, by their retiring to die amongst the secluded precipices. Their favourite feeding-places are grassy knolls skirted by craggy rocks, to which they can retreat when pursued by dogs or wolves. They are accustomed to pay daily visits to certain caves in the mountains that are incrustated with a saline efflorescence, of which they are fond. These caves are situated in slaty rocks, and it was in them alone that Mr. Drummond found the *Weissia macrocarpa* growing. The same gentleman mentions that the horns of the old rams attain a size so enormous, and curve so much forwards and downwards, that they effectually prevent the animal from feeding on level ground. The flesh of the Rocky Mountain sheep is stated, by Mr. Drummond and others who have fed on it, to be quite delicious when it is in season, far superior to that of any of the deer species which frequent the same quarter, and even exceeding in flavour the finest English mutton. The Kamtchatdales in like manner esteem the flesh of the argali as food fit for the gods."

In size the Rocky Mountain sheep, or big-horn (of Lewis and Clark), exceeds the Asiatic argali. An adult

male measures six feet in the length of the head and body, and three feet five inches in height at the shoulder. The horns are much larger in the male than in the female; in the former they are of great thickness, three-sided, furrowed transversely, and curving from their base first backwards, then downwards, forwards, and upwards, until they form a complete turn, during the whole course of which they recede from the head in a spiral manner. In a full-grown male they measure about two feet ten inches, following the curve, and have a basal circumference each of twelve or thirteen inches. In the female they are nearly erect, short, and slightly inclined backwards, and at the tips outwards.

The Nahoor, or Snà, of Thibet (*Ovis Nahoor*, Hodgson), a native of the Kâchar region of Nepâl and the glaciers of the Himalaya.

The Burrhel (*Ovis Burrhel*, Blyth), a species allied to the latter, and inhabiting the highest ridges of the Himalayan chain, where it "bounds lightly over the incrustated snows, at an altitude where its human pursuers find it difficult to breathe. It has the bleat of the domestic species, as indeed they all have, and is very shy and difficult of approach. Flocks of ten or twenty have been observed conducted by an old male, which make for the snowy peaks upon alarm, while their leader scrambles up some crag to reconnoitre, and, if shot at, bounds off a few paces, and again stops to gaze. They pasture in deep and hollow grassy glens." A specimen, in the Museum of the Zoological Society, was shot near the Boorendo Pass, at an altitude of about 17,000 feet.

The Caucasian Argali (*Ovis cylindricornis*, Blyth), hitherto confounded with the Siberian Argali.

The Armenian Argali (*Ovis Gmelinii*, Blyth).—Specimens of this sheep, from Erzeroum, are living in the Gardens of the Zoological Society. "According to Gmelin, this species is found only in the highest mountains in Persia. The males, he informs us, are very quarrelsome amongst each other, insomuch that he had been at one place where the ground had been strewn with horns that had been knocked off in their contests."

It is allied to the Corsican mouflon. "Sir John MacNeill informed me that 'it appears to be the common species of the mountains of Armenia; occurring likewise on the north-west of Persia;' but the wild sheep of the central parts of Persia is evidently distinct, 'having horns much more resembling those of the domestic ram, being spiral, and completing more than one spiral circle. I think I am not mistaken in supposing,' continues Sir John, 'that I have also had females of this species brought to me by the huntsman with small horns, resembling those of the ewes of some of our domestic sheep; but, on reflection, I find that I cannot assert this positively, though I retain the general impression.' It is highly probable that a wild type of *O. Aries* is here adverted to, which would thus inhabit the same ranges of mountains as the wild common goat (*C. Agagrus*); and with respect to the circumstance of horns in the female sex, I may here remark that this character is very apt to be inconstant throughout the present group."

The Shà (*Ovis Vignei*, Blyth), a mouflon inhabiting the mountains of Little Thibet and the Sulimani range between India and Khorassan. "Vast numbers of this species are driven down by the snow in winter to the branches of the Indus, where the river breaks through the chain of the Himalaya." The wild sheep of the Hindoo Koosh mountains, described in the 'Journal Asiatic Soc. Beng.' for 1840, is either this or a closely allied species. Its climbing powers are extraordinary.

The Corsican Mouflon (*Ovis Musimon*, Linn.), a native of Corsica and Sardinia. Speaking of this sheep, Mr. Blyth remarks—"It has always appeared to me, however, that the specific distinctness of the mouflon is very obvious, and I doubt whether it has contributed at all to the origin of any tame race. That it interbreeds freely with the latter, under circumstances of restraint, is well known; but we have no information of hybrids, or Umbri, as they are called, being ever raised from wild mouflons, though the flocks of the latter will occasionally graze in the same pasture with domestic sheep, and all but mingle among them. The male of this animal is

denominated in Corsica Mufro, and the female Mufra, from which Buffon, as is well known, formed the word Mouflon; and in Sardinia the male is called Murvoni, and the female Murva, though it is not unusual to hear the peasants style both indiscriminately Mufion, which (as Mr. Smyth remarks, in his description of that island) is a palpable corruption of the Greek Ophion. It is sometimes stated, but I do not know upon what authority, that a few of these animals are still found upon the mountains of Murcia."

The Cyprian Mouflon, probably different from the preceding, and termed by Mr. Blyth *O. Aphion*.

In this review of Mr. Blyth's paper we have omitted the Ixalas Probaton, Ogilby (of which a unique specimen exists in the museum of the Zoological Society, London, the history of which is obscure), and the Aoudad (*Ovis Tragelaphus*, auct.), which we refer to the goats.

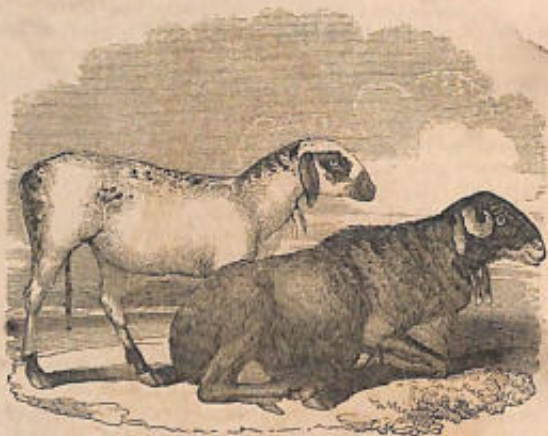
From none of the species here enumerated can we confidently select the type of the domestic sheep (*Ovis Aries*, Linn.).

The Mouflons and Argalis, that is, the wild species of the genus *Ovis*, are covered with a harsh kind of hair, having beneath it at its roots a short spiral wool, which in winter becomes longer and fuller. Mr. Bell, indeed, considers the harsh hair as essentially wool in its structure, presenting the imbrications which the microscope shows to be the characteristic of wool, and on which its felting property depends; and he regards the short under-coat as composed of hair, and not of wool. Mr. Youatt makes the contrary statement, and notwithstanding the appearances noticed by Mr. Bell, we incline to Mr. Youatt's opinion; for, be it observed, in the Cashmir and the Angora goats the long outer garment is hair; the short under-coat exquisitely fine wool. In other wool-bearing animals, as the beaver and otter, the same arrangement prevails; and we know, moreover, that in some neglected breeds of common sheep the wool becomes mixed with long hairs (not short and fine), which more or less obscure the wool.

The causes which have rendered the fleece of the

European sheep what we now find it are involved in obscurity. We attribute much, in the first instance, to the effects of temperature; for though the merino sheep of Spain (a race originally imported from England), and the flocks of Australia and Southern Africa, are pre-eminent as wool-bearers, yet it would seem that the predisposition to develop wool at the expense of hair is acquired only in temperate, elevated, or even cold climates. For instance, we learn from Mr. Hodgson that the wool of the Bhootan domesticated sheep, called Huniah, is superb, and he adds, the animal is suited only to the northern district of Nepál, suffering much from the heat of the central district. ('Zool. Proceeds.' for 1834, p. 99.) On the other hand, it is clear that in the early ages of man's history the shepherds must have selected for breeding those individuals on which the wool predominated, and that, by following up this system, the sheep gradually attained its present condition, so that a wool-bearing breed became at length permanently established. Originally, perhaps, the sheep, then a wool-bearer, and long domesticated, was of a brown or rusty black colour, a hue still lingering on the faces and limbs of many of our breeds, and sometimes appearing as the general tint of individuals, thus conspicuous in the midst of their white-fleeced companions. Nine out of ten of the sheep of Deccan are black, with short, crisp, coarse wool.

As the primitive fleece of the sheep was a mixture of hair and wool, we cannot be surprised to find races domesticated in which the hair predominates over the wool, and that so greatly, that they may with propriety be termed hairy. Sometimes the hair is like that of a spaniel dog, long and silky, and many of the flocks of the Bucharian Tartars are thus clothed. To this breed may be referred the Cretan or Wallachian sheep (*Ovis Aries*, var. *Strepsiceros*), common in Crete, Wallachia, Hungary, and the western parts of Asia. Of this variety a splendid ram from Mount Parnassus was presented by Dr. Bowring to the Zoological Society of London. It was vicious, unruly, and of amazing strength. Its horns



131.—Guinea Sheep.

were very large, and spirally contorted, adding greatly to its striking and picturesque appearance. Its fleece consisted of hair and wool, the former being of great length, perfectly straight, close-set, and beautifully fine, falling from the middle of the back on each side of the animal, almost to the ground. On the face the hair was short, and of a rusty black; on the body it was white. In general, the horns in the male rise almost perpendicularly from the skull, making a series of spiral turns in their ascent, the first turn being the largest, while in the female they diverge, taking a lateral direction. In the specimen, however, to which we have alluded, they extended laterally from the skull, and after the first turn took a downward sweep; variations in these points may be expected in domesticated animals. In some varieties of the Guinea sheep the hair is coarse and often shaggy. In the specimens of Guinea sheep figured (Fig. 131) the limbs are long, the body gaunt, the ears pendulous, the



132. - Persian Sheep and Caracul.

forehead arched, and two fleshy excrescences hung from the throat. A smaller hair-clad breed extends along the Slave Coast. The Fezzan sheep, of which we have seen examples in England, closely resemble the Guinea sheep, but have a pendulous dewlap, instead of the tassels of skin on the throat. They are gaunt, coarse-haired, ill-formed animals, with high withers like a buffalo. The males have small horns. In Madagascar the sheep are covered with short hair. In Persia, Tartary, and other parts of the East, there has long existed a singular variety, with a great deposit of fat on the tail and croup, giving an unsightly appearance to the animal: the tail itself is short, and seems buried in the mass on each side; the body is generally white, the head and neck black: of the variety (*Ovis Aries*, var. *Steatopygus*) we have seen specimens in the gardens of the Zoological Society of London. Fig. 132 is a portrait of one of these sheep, with a caracal brought from Persia. The fleece of the sheep consisted of short, coarse wool, mixed with hair.

Among other strange varieties of sheep may be here noticed the sheep of Syria and Egypt, with a long tail loaded with fat, which sometimes even trails on the ground. This race (*Ovis Aries*, var. *Macrocerus*) is closely allied to the preceding. (Figs. 133 and 134.) In the Egyptian animals the tail is broad throughout, but in the Syrian it narrows to a point. The ordinary weight of the tail is fifteen pounds, but in some of the larger kinds, well fattened, the tail will weigh seventy, eighty, and, it is said, even one hundred and fifty pounds. Ludolph saw in Egypt a sheep's tail of eighty pounds' weight. This overgrown tail is a great inconvenience to the animal, and in order to prevent injury to it, the shepherds are often obliged to fix a thin piece of board to the under surface of the part that trails on the ground, to which small wheels are sometimes added. Our figures exhibit the Syrian variety with only a moderate caudal development. The caudal deposit of fat in these varieties of sheep is oleaginous, being of a consistence between fat and marrow, and is often used in the place of butter; when the animal is young, this fat is stated to be little



133.—Fat-tailed Sheep of Syria.

inferior to the best marrow. The long-tailed breed (var. *Macrocerus*) is not only found in Arabia, Syria, and Egypt, but is very numerous in the interior and southern parts of Africa, and is covered with a mixture of coarse short wool and hair.

Before we proceed to take a general survey of the more important breeds of our British sheep, we may observe, that besides the variations to which we have alluded,

respecting fleece and general form, the horns are subject to great difference of size and curvature, and are sometimes wanting in both sexes, sometimes only in the female; while, on the contrary, in some breeds the number of horns is increased beyond the natural allotment.



134.—Fat-tailed Sheep of Syria.

In Iceland and the Feroe Islands there are two races of sheep: one of a small size, and of a dun or rust-black colour; the other of larger size, and white. Both these races are remarkable for the number of their horns, varying from three to eight. Four, however, is the usual number, as in the drawing of the head. (Fig. 135.) Of the larger race we have seen many individuals: they are strongly-built animals, with a coarse fleece, consisting of long hair externally, and an under-layer of close wool, impenetrable by the heaviest rain. The wool, however, is of little value, being fit only for horse-cloths and common rugs. These sheep yield an extraordinary quantity of milk, far superior to that of any of the southern breeds. Von Troil, in his 'Letters on Iceland,' states that a single ewe will yield from two to six quarts a day. In the Feroe Islands is a wild race of sheep, of great an-



133.—Head of Four-horned Ram.

tiquity. They are covered with black, short, curled wool, and their flesh has a peculiarly dark appearance and venison-like flavour.

In 1821 Mr. Trevelyan visited the Feroe Islands, and found the remnants of this wild race, in no way dependent upon 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.

Among the breeds of Europe which have attained to

the highest celebrity, and by means of which, through judicious crossing, the sheep of Saxony, Prussia, Austria, and England have been greatly improved as respects the quality of the fleece, is the far-famed Merino of Spain. (Fig. 136.) The term "merino" alludes to the over-sea origin of the race, and there are good grounds for believing that these Spanish sheep are originally of British extraction, being of the old Ryland or Cotswold stock. Stow and Baker, in their Chronicles, say, "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 King John of Arragon, to whom he sent a score of Costal ewes and four lambs."

There are other breeds of sheep in Spain besides the Merinos, more or less intermixed with them; but of the pure race it is calculated that there are about ten millions, which, excepting perhaps the flocks of Leon and Estremadura, are migratory, and termed *transhumantes*, being periodically conducted from one part of the country to another, and back again.

These *transhumantes* are divided into flocks which, under the care of a mayoral, or chief shepherd, and assistants, migrate from the mountains of the north to the plains of the south in winter, and return back to the mountains in summer. The flocks follow the shepherds, who lead the way, and direct the length and speed of the journey: a few wethers perfectly tamed, tread in the footsteps of the conductor, and the rest follow in due order; a powerful breed of dogs accompany the shepherds in order to defend the flock from wolves, and a few mules carry their provision and other necessities, as well as materials for making up the fold at night.

This migratory system is regulated by a tribunal termed *Mesta*, which has been of old standing; it can be traced back to the middle of the fourteenth century, at which period definite laws with respect to it were enacted, by which persons were prohibited from travelling along the course of the route pursued by the flocks while the sheep were in motion; it also established a



134.—Merino Sheep, male and female.

right to graze on all the open and common land that lay in the way ; and moreover it claimed a path, ninety yards wide, through all the enclosed and cultivated country. The journey taken by the Merino flocks is upwards of four hundred miles, which they accomplish in six or seven weeks, and the same time is spent in retracing the route, so that in every year about fourteen weeks (or nearly a quarter) are spent in these toilsome journeys. Popular prejudice in Spain attributes the superiority of the Merino wool to this practice—a practice injurious to the agriculturist, through whose corn-lands and vineyards the flocks pass, and injurious to the keepers of stationary sheep, inasmuch as the common and pasture lands are completely eaten bare by the multitudes that slowly pass over them, while wilfully, or through carelessness, serious damage is done to farms, plantations, fields, and vineyards, for which no redress can be obtained.

It is, however, much to be doubted that the Merino wool owes its superiority, as is asserted by the Spaniards, to this system. The stationary Merinos in Leon and Estremadura produce wool equal in quality to that of the migratory flocks, and these are again exceeded by some of the German Merinos, which never travel, so that at least the advantages of the Mesta system have been overrated, while the evils resulting to the flocks from fatigue, and the injury done to the lands in their course, have been treated with indifference.

In Spain, as in the East from the earliest times, the shepherd leads his flock. In Italy, in Greece, and some parts of France, it is still the custom ; and the reed-pipe of the shepherd may be heard calling the flock together, or the troop seen following him as he leads them to their evening folding-place.

In Piedmont, the fine race described by Pliny long continued to preserve its old reputation ; but of late the Alpine region of Italy has received importations from various countries, and among them flocks of the Merino-breed, insomuch that nowhere can the pure relics of an ancient stock be found. In different parts of the Alps the sheep are more or less numerous, and of more or less

value, according to the mountainous character of the country and the quality of the pasturage. In Savoy the necessity of housing the sheep in winter, and the difficulty of providing them with food during that season of the year, tend to circumscribe their numbers; and the few that are kept by the peasants are maintained for the sake of their wool. We copy the following statement from the personal observation of a gentleman. He writes—

“In the mountains of Savoy, although the soft sound of the sheep-bell is often heard, there are no large flocks, as it is absolutely necessary to keep them housed during the severe winter season, and as scarcely any of the peasantry or farmers have the means of thus sheltering them on a large scale.

“There are of course exceptions near the city of Chamberi, and in some other places, but, generally speaking, the Savoyard peasant possesses a small piece of ground capable of cultivation, on which he raises potatoes (now their principal food) in quantity sufficient for his family. The rest of his wealth consists of a few sheep and goats, a cow, or perhaps two or three cows, and an ass. The cows and the goats give their milk, the sheep their wool (of which the primitive clothing of the Savoyards is chiefly made), and the ass serves to bring home the dried leaves of autumn, the winter food of the sheep and goats, to carry wood for fuel, and to do sundry other useful duties. A pig or two are sometimes added to these possessions. The interior of a Savoyard cabin, where most of these domestic animals are frequently found lodged as forming part of the family, presents a curious scene to the stranger. The writer of this had once the fortune to pass a night in such a dwelling. On returning home from an excursion in the neighbouring mountains he felt himself so fatigued, and the night was so advanced, that, instead of going on to Lanslebourg at the foot of Mont Cenis, where, at that time (1819), there was a tolerably comfortable inn kept by an Englishwoman, he accepted the invitation of some peasants, who had been his guides and only companions, to stop

short at their abode at Lanslevillard, a small village not far from Lanslebourg. He had found the poor fellows civil and obliging, active and sufficiently intelligent, and was also glad to see more of them and their way of living. A path, scarcely discernible through the snow which had fallen (the season was November), led to a group of low cottages, central among which was the residence of his hosts, which seemed the most considerable of them. Before it there was a yard, shut in with hurdles and a gate, and on one side of it was a pig-sty (the pigs not having here the honour of the *entrée*), and on the other a low shed, joined to the cottage for warmth and comfort.

"Within the cottage was a tolerably large room, where, by a fire, rather small for the season, and which had its back towards the cow-shed, two women sat spinning with the distaff, and a little boy playing with a venerable-looking goat.

"The fire was speedily renewed, and an old cauldron put over it to cook the supper. This meal consisted of boiled potatoes, boiled milk, some slices of bread chopped from a loaf as hard as a millstone, and almost as big, but much darker in colour, and a few chestnuts, the last fruit being part of a valued hoard annually imported from the Italian country of Piedmont, on the other side of the Alps. They had no wine, beer, or spirit,—no liquids whatever, save water and milk; all their stores were produced for the stranger, and if a king had been their guest they could not have furnished another luxury. It was, however, more than enough to excite the appetite of a less hungry or more fastidious traveller, to see the zest with which the poor Savoyards partook of these goods. The supper, in honour of the guest, was, no doubt, to them one of unusual excellence.

"After many excuses had been made as to accommodations, a bundle of clean straw was carried into a small inner room. The bed or bed-place in this apartment was built against the wall like a berth on board ship, and still more like the dormitories used by the Scottish peasants, which recesses are shut up by daytime, or par-

tially closed when the nights are very cold, after the fashion of presses or cupboards. In this recess, after driving out of the room three or four sheep and a goat, the Savoyards laid the straw; over the straw they laid some sheep-skins, which, with the addition of an old grey cloth coat, were all the materials they could furnish as sheets, blankets, and coverlets.

"The bed, however, was sufficiently warm and comfortable, and the traveller slept very well, his only annoyance arising from a frolicsome young goat who did not like to be dispossessed of what was probably his usual quarters. This agile creature contrived to open the room-door, which was closed only by a wooden latch, and presently after jumped into the sleeping-place, where he amused himself by tugging the straw from beneath the stranger, and playing other tricks, until he was forcibly ejected, and the room-door secured by means of the iron point of the traveller's alpenstock.

"The *réveillée* in the morning was striking to the stranger: the cows lowed, as if they were close to his bed-head; the sheep bleated, the ass brayed, the goats capered, the pigs squeaked—all seemingly under the same roof. These creatures were calling for their breakfast.

"Nearly every part of the dress of a Savoyard peasant is produced from his own little flock. He dresses the wool himself, his wife or daughter spins it, and then the yarn is woven into cloth by the village weaver. The holiday coats are generally dyed blue, but those of every day wear are of less expensive colour. As they have plenty of black sheep in Savoy, they mix their wool with the wool of the white sheep, and, spinning them together, produce a sort of grayish brown cloth without the expense of dyeing. In another part of the Alps, the Grisons took their name from their custom of wearing gray cloth similarly manufactured.

"As soon as the severity of winter is passed, the Savoyard turns out his cows and sheep, esteeming himself fortunate if his provision of hay for the cows, and dried leaves for the sheep has sufficed for the time he

has been obliged to keep them under his roof. At first they graze in the low valleys near the villages, where the snow first melts, and by degrees, as the verdure succeeds the wintery covering of the mountains, they ascend higher and higher. They are, however, almost invariably driven home for the night, even during the summer season. This duty falls to the women and girls, and few scenes can well be more soothing and pastoral than those which the traveller is almost sure to meet on approaching a small Savoyard town or village towards the sunset of a summer's day. From all sides small flocks of sheep and goats, with a cow or two, and generally a few pigs, descend the hill-sides towards the homesteads, conducted by women and girls, who are always busily employed as they walk along, either in platting straw, or in knitting, or in spinning wool or flax with the distaff."

In Greece it is usual, as formerly, to give names to the sheep, which they know and will answer, coming to the shepherd when called. Fig. 137 represents the pleasing spectacle of sheep thus conducted, and on terms of familiarity with their leader, whose voice they obey, though "they know not the voice of strangers."

Reverting from foreign sheep to those of our own island, we may remind the reader that we possess several different breeds, distinguished by different qualities, both as regards form and size, and the characters of the wool. These breeds, or varieties, are the result of skilful treatment, of pasturage, and judicious crossings.

We may divide them into three groups: the short-woolled, the middle-woolled, and the long-woolled breeds.

The short-woolled breed formerly included many varieties, now, from the improvement of their fleece, to be ranked under the second division, as the South-Down, Norfolk, and Cheviot sheep. It is at present, however, represented by the Anglo-Merino race, to which the sheep of New Holland and Van Diemen's Land also belong. The average length of the wool is about two inches and a half, and its texture is peculiarly fine, soft, and even silky. Short wool is used in the manufacture of delicate and beautiful fabrics; it is, however, generally



187.—Oriental Shepherds.

mixed with wool of a longer staple. The Saxony wool, so valued for its fineness, comes under the present division: it is shorter and finer than the Australian wool, but less silky, the serrations of the fibre being more numerous, and disposing it to felt more closely. Hence Saxony wool is the most valuable for the manufacture of fine broad-cloth.

The average weight of the fleece of the Australian short-woolled sheep is from three pounds to three and a half; sometimes it amounts to five.

"There is no wool," says Mr. Hughes, "which spins so well as the Australian; large importations are annually sent to the British market, at an average of 2s. 6d. per pound. In 1833 the quantity imported from New South Wales and Van Diemen's Land amounted to 3,516,869 pounds." The quantity has since increased very largely.

It has been the object of the British wool-grower to convert the short-woolled breeds into a race with wool which, while its length is increased, preserves its original fineness and delicacy. Thus we have now, in place of the old short-woolled breeds, a middle-woolled race of great value, and of which the fleece is in the highest request.

The middle-woolled sheep include the South-Down, the Dorset, the Norfolk, the Suffolk, the Ryland, the Welsh, and the Cheviot breeds, together with several others, and which were formerly short-woolled. The length of the staple is, on the average, three and a half or four inches.

That the improvement of the old short-woolled sheep into a middle-woolled race is an advantage in every sense, especially as the short wool used exclusively in the manufacture of fine cloths is abundantly supplied from foreign "growers" (as the term is), no one can doubt. Of this race, one of the first is the improved South-Down breed depasturing on the long range of chalky hills extending from the sea-coast of the Isle of Thanet, and the cliffs of Dover, through Kent and Sussex. Formerly this breed, as Mr. Ellman states (*Library of Agricultural Know-*

ledge'), was a small size, far from possessing a good shape, and late before they were capable of being fattened; now, however, they are greatly improved both in shape and constitution. "They are smaller in bone, equally hard, with a greater disposition to fatten, and much heavier in carcase when fat. They used seldom to fatten till they were four years old, but it would 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." The South-Down sheep is in fact the model of what a hill sheep ought to be, and the flesh in fineness of grain and flavour is peculiarly excellent. The wool is of a very useful quality, but is both larger in fibre and less numerously serrated than the short Saxony, and does not therefore possess such a felting power; hence it is rarely used in the manufacture of fine broad-cloths. Still from its fineness and felting powers, compared with the wool of many other middle-woolled breeds, it is highly esteemed—and for flannels and worsted goods in general is extensively employed. In Surrey, Hampshire, and Berkshire, the South-Downs have either superseded or been blended with the old short-woolled sheep.

Dorsetshire possesses its own breed, encroached upon, however, by the South-Downs. The males have large, spirally-twisted horns, and the females have also horns, but much smaller than those of the male. Neither the wool nor the flesh equals that of the South-Down breed. The old Norfolk breed of middle-woolled sheep is very valuable, but it is rapidly giving way to the South-Down. The rams are distinguished by long spiral horns, those of the ewes and wethers being smaller; the flesh is remarkably fine, and the wool delicate, and felts well. The figure of these sheep is tall and slender; the legs are long, and the face and limbs black or mottled. The general aspect is wild and animated. This breed thrives on the coarsest pasturage. The wool is not used in fine broad-cloths, but is used in such as are of inferior quality, and in woollen stuffs generally.

In Suffolk the South-Down breed prevails. The

black-faced and horned sheep of Westmorland, Cumberland, and various parts of Scotland, as Lanarkshire, belong to the middle-woolled section. With respect to their wool, these sheep do not rank high; it exceeds in length that of the middle-woolled breeds generally, but is harsh and coarse; to compensate for this these sheep are very hardy, have an admirable contour, and the flesh in fineness of grain and delicacy of flavour equals either the South-Down or the Welsh mutton.

The Cheviot breed is very distinct from the common mountain or black-faced race, with which it is on all sides immediately surrounded, these two races dividing the North between them.

The Cheviot breed is hornless, and the general contour is excellent; the shoulders are full, the body round and long, and the limbs small-boned. The mutton is in great esteem; and the wethers average sixteen, eighteen, or even twenty pounds weight per quarter. It appears, from the testimony of practical farmers, that the attention paid to the improvement of this breed, in reference to the condition of the carcase, has been followed by a deterioration in the quality of the wool, which is said to have been formerly capable of entering into the manufacture of fine cloths. Still, however, the wool is good, though inferior to that of the South-Downs. It far surpasses that of the black-faced breed, and as the Cheviot race is equally hardy and as capable of sustaining cold as the former, and is content with the alpine plants of the bleak hills and mountains, it will soon supersede the black-faced breed, as it has already done in the forest of Ettrick and the whole of Selkirkshire, and even Sutherland. The foreknowledge which these sheep possess of approaching storms, and the assiduity with which, while the shepherd dreams of no impending evil, they will seek a place of shelter and security, are curious traits in their history. It is thus that they often warn the shepherd, by the display of this instinct, wisely implanted within them, and lead him to add his precautions to those which they have themselves adopted. In spite, however, of the vigilance of the shepherd and the instinct

of the sheep, many often perish, buried beneath towering snow-drifts, and sometimes whole flocks are lost. It often happens that sufficient shelter cannot be obtained, the flock crowd together for the purpose of mutual warmth, and are soon covered beneath the snow. If this does not occur, the lambs, unable to endure the severity of the storm, perish, and the mothers, bewildered, wander about seeking their offspring, till they themselves sink exhausted with their efforts and distress. With but little food sheep can remain for many days buried beneath the snow; but where this cannot be obtained, the period of endurance is proportioned to the strength of the animal's constitution and the intensity of the cold. In the winter of 1800 a sheep near Kendal was buried in the snow for thirty-three days and nights, without the possibility of moving, and yet survived; and a sheep in Cumberland was buried for thirty-eight days. When extricated it was found to have eaten the wool off both its shoulders, and its frame was reduced almost to a skeleton. By due attention, however, it gradually recovered.

Having thus specified some of the more important of the middle-woolled breeds of sheep in our island, most of them, or all, derived from the old short-woolled breeds by a system of judicious management, we shall now take a hasty survey of the long-woolled breeds.

As we have already stated, the middle-wool varies in different breeds in fineness and in its power of felting. Long wool is much more uniform, and for this reason, that it is the produce of the Leicester race, and of races with which the Leicester race has become completely intermingled. "All long-woolled sheep," says Mr. Youatt, "both in appearance and in fleece, are becoming one family." Long wool, which has lately very much improved, it being the aim of the breeder to render it finer (at the expense of its length, which it will bear), is characterised by strength and transparency, but it is deficient in the power of felting. Its average length is about eight inches. This applies more particularly to that sort called the long-combing wool; there is, how-

ever, a variety of long wool which approximates to the middle wool, and termed the short-combing wool, which is somewhat shorter than the other, finer, and more disposed to felt. The long-combing wool is used in the manufacture of hard yarn, and for purposes in which length and firmness are essential; the other for stuffs of a softer texture, and for hosiery goods. We have alluded to the Leicester breed as the typical example of the long-fleeced races, but it is to be observed that this breed is an improvement upon the heavy, ill-made, and coarse-woolled race, formerly spread over all our midland counties. Lincolnshire also had a breed of sheep celebrated for their fine long wool; but this breed, defective in form, and yielding mutton of inferior quality, is now greatly improved, and in fact is blended with the new Leicester sheep.

It is not within our province to follow out the changes which have already taken and are still taking place among the long-woolled breeds of sheep for which our island is expressly celebrated, and in which neither France nor Belgium can at all compete with the English sheep-graziers. To those who wish to gain an acquaintance with this part of the subject, we recommend Mr. Youatt's valuable work on sheep, where he will find much information and abundant reference to various writers on agricultural topics.

There is, however, one question which suggests itself, and which we cannot omit to notice. As far as records serve us, it would seem that a long-woolled and a short-woolled (now middle-woolled) race of sheep have tenanted our island from the earliest times. Now to what are we to attribute this original difference? Are the two races descended from different primitive sources, or have food and soil gradually produced the differences which have been so long maintained? No one, we think, will hesitate to say the latter; impossible as it may be to follow step by step the progress of the change, or to determine the *modus operandi* of the causes contributing to effect it. It is, however, very remarkable that it is only in animals which have been so long domesticated that we

cannot tell their primeval origin, and which there is reason to think are factitious beings (that is, the produce of different, but still closely-allied species commingling together), that these extreme variations as to size, figure, and length and quality of fur are most decidedly observable. We see these varieties in the dog—from the silky long-haired spaniel of Spanish race, to the close-haired old setter of the same country; from the woolly French poodle, to the *mâtin*; from the rough English water-dog, to the mastiff: so in the sheep we find a short-fleeced breed, with the filaments of the wool peculiarly fine and numerously serrated; a still longer-fleeced breed, again subdivided into many minor varieties, and having the wool fine, and more or less capable of felting, or, in other words, more or less numerously serrated; and a long-woolled race of old standing, in which the wool, but thinly serrated, is inferior in felting properties, but of great value to the woolcomber. But further, as the mixture of a long and silky-haired breed of dogs with one of close hair does not improve the coat, the young resembling some the male, some the female, but not equalling them in their excellences; so the crossing of long-woolled and short-woolled sheep leads to no good results; and, as with dogs, the improvement of each breed depends on a judicious and careful selection of the best and purest of that breed, by which the properties distinguishing it may be developed to their maximum in their progeny.

In England the sheep is now only valuable for the sake of its wool and flesh, but in various parts of both Europe and Asia the milk of the ewe has been used from the earliest times, either pure or curdled, as an article of diet. Formerly, in many parts of England, cheese was made from the milk of the ewe, and the ewes, to the injury of the lambs, were milked regularly, as described in the '*Odyssey*,' and, at a later era, by Virgil:—

"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 mothers' teats submits the lambs.
 Half the white stream to hardening cheese he press'd,
 And high in wicker baskets heap'd; the rest,
 Reserved in bowls, supplied the mighty feast."

Pope, *Odyss.*, lib. ix.

To the process of shearing we need scarcely allude; all are familiar with the manner in which the removal of the fleece is effected, and it would seem that in the earliest patriarchal ages the same process was in use. Among the Romans, however (and the practice has been but lately discontinued in the Orkney Islands, and is, perhaps, still prevalent in Iceland), the wool was torn off the animals, and, as Pliny states, they were kept for three days previously without food, in order that the wool might be the more easily detached, their bodies being exhausted. In his time, however, the practice of shearing had begun to supersede this cruel and unjustifiable method. It gave, however, origin to the word *vellus* (fleece), from *vello* (to pull away), and the hill termed *Velleia* was the ancient spot on which this cruelty was perpetrated.

With us the season of sheep-shearing is a season of rejoicing, and the manner in which the important work is conducted, and the dexterity of the shearers, are, to those not accustomed to rural life, replete with interest and amusement. It is, indeed, a pleasing spectacle to see a large flock of snow-white sheep collected together, and in turn losing their soft fleece, rolled into an unbroken and well-arranged whole, beneath the shears of the shearer: the picture is full of poetry, and he must be destitute alike of taste and patriotism that can look coldly upon it.

To enter into a disquisition on the commercial importance of the sheep, its connexion with national prosperity and international relationships, is not our place. We leave this to the political economist.

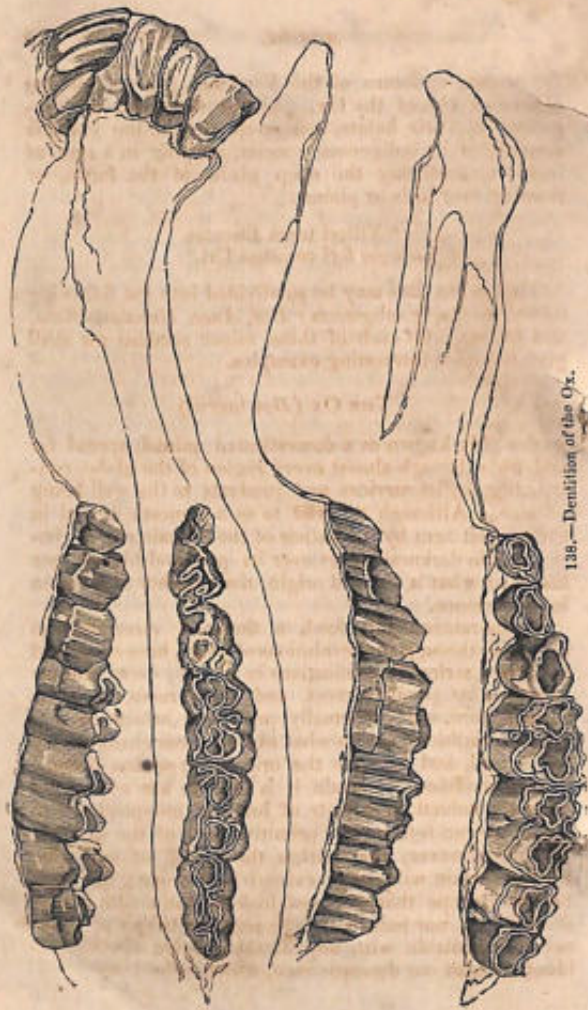
Before we close, let us again revert to our starting-point—the question as to the origin of the domestic sheep. It is clear that we cannot identify it with any wild spe-

cies with which we are yet acquainted. If such exists, it is most probably to be found on the mountains of Armenia—but this is problematical; and there is some ground for supposing that, though the sheep of every region intermingle with each other, they have descended from different primitive origins. The subject is full of obscurity. It is, indeed, strange that, while history teems with the accounts of battles, massacres, invasions, the reigns and the crimes of kings, it throws no light upon the domestic animals which man has reclaimed. The motives which led man to attempt this important work, the manner in which he accomplished it, the characters and native abodes of the species selected, are buried in silence. The subject was too mean for history—the actors too humble to be noticed; but thus it ever is, that the glare of mighty deeds effaces the record of the useful, the beneficent, and the truly great.

GENUS BOS.—OXEN.

Horns in both sexes. Neither suborbital sinus, interdental fossæ, nor inguinal pores. Teats in females, four. The animals of this genus are, with some few exceptions, the largest and most massive of the hollow-horned Ruminants; their limbs are low and strong, their body heavy, with wide haunches, and thick and often elevated shoulders; the head is large, and furnished with horns common to both sexes; their progressive increase being marked by annuli at the base. They sheath a hollow or cancellous bony core, continued from the sides of a bold frontal ridge. The forehead or *chaffron* is expanded; the muzzle, except in the subgenus *Ovibos*, is broad, naked, and moist; the neck is thick, deep, compressed laterally, carried horizontally, and furnished with a pendent dewlap. The spinous processes of the anterior dorsal vertebræ, at the withers, are very long and stout.

Fig. 138 represents the dentition of the Ox, in two views of the upper and under jaw; Fig. 139 is a very characteristic delineation of the skeleton of the English short-horned Cow; and Fig. 140 is a representation of



138.—Dentition of the Ox.

the osseous structure of the Fore-foot (*a*) and of the Hind-foot (*b*) of the Ox. All the Ox group are gregarious in their habits, and no quarter of the globe is destitute of its indigenous species, existing in a state of freedom, tenanted the deep glades of the forest, or roaming over hills or plains :

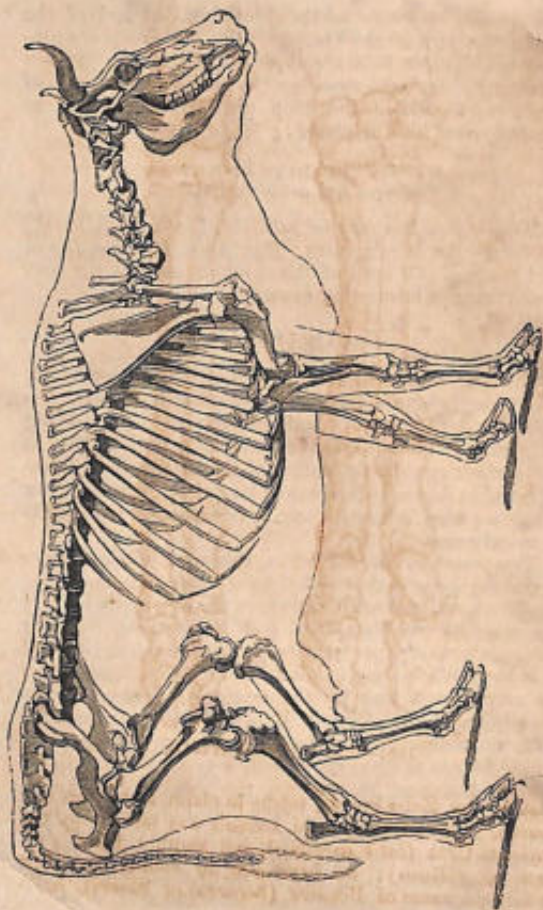
“Villosi terga Bisontes
Latisque feri cornibus Uri.”

The genus *Bos* may be subdivided into the following minor groups, or subgenera : *Bos*, *Anoa*, *Bubalus*, *Bison*, and *Ovibos*. Of each of these minor sections we shall give the most interesting examples.

THE OX (*Bos taurus*)

is now only known as a domesticated animal, spread far and wide through almost every region of the globe, contributing by its services and products to the well-being of man. Although referred to as a domestic animal in the earliest ages by the author of the Mosaic record, impenetrable darkness hangs over its primeval history, nor know we what is its wild origin, nor whether that origin is in existence.

Temperature, soil, food, a thousand circumstances operating through the revolutions of years, have combined to effect a series of modifications in the ox ; every country possesses its peculiar races, and these races, by their intermixture, are perpetually producing others, so that it is impossible to say to what extent these changes may be carried, and how far the original type has become already modified. Certain it is that we are acquainted with no animal in a state of original independence to which we can refer as the primitive type of the ox. It is true, however, that within the period of authentic history certain wild oxen existed in Europe ; but it is not to Europe that we must look as the cradle of the domestic ox, nor indeed are the accounts left us of these oxen reconcilable with any of them being specifically identical with our domestic race, which indeed, wh



129. — Skeleton of Cow.



140. —Hind and Fore Feet of Ox.

look at the Zebu breeds, seems to claim more than one source. One of these wild animals was termed by the ancients *Urus* (*latis cornibus*), and another *Bison* (*julatus* or *villosus*); we have also an animal described under the name of *Bonassus* (*Βόνασσος* or *Βόνασος*, Aris-

tote). A few observations on these animals may not be uninteresting. The urus, which existed in the Hercynian forest, is thus described by Cæsar: "These uri are little inferior to elephants in size, but are bulls in their nature, colour, and figure. Great is their strength, and great their swiftness; nor do they spare man or beast when they have caught sight of them. These, when trapped in pitfalls, the hunters unsparingly kill. The youths, exercising themselves by this sort of hunting, are hardened by the toil, and those among them who have killed most, bringing with them the horns as



141.—Skull of fossil Aurochs.

testimonials, acquire great praise. But these uri cannot be habituated to man, or made tractable, not even when young. The great size of the horns, as well as the form and quality of them, differs much from the horns of our oxen. These, when carefully selected, they ring round the edge with silver, and use them for drinking at their ample feasts." Perhaps the wild bulls with horns of

extraordinary size which Herodotus assures us inhabited Macedonia, as well as did the lion, were uri.

The *Bison jubatus* of Pliny.—This species, regarded by Cuvier and most naturalists as identical with the bonasus of Aristotle, is considered, and perhaps with reason, as referable to the Aurochs or Zubr (*Bos urus* of



142.—Side view of Skull of fossil Aurochs.

modern naturalists, not the urus of Cæsar) still existing in the wild forests of Lithuania. In Europe and Siberia the fossil crania of an aurochs are not uncommon, and these skulls, though they scarcely differ in anything from the Lithuanian animal, Cuvier inclines to believe may be of a different, though closely-allied species. He gives the figures of a skull in the Paris museum, here copied (Fig. 141, front view; Fig. 142, lateral view), so like, as he observes, to the living aurochs, that the most practised eye can scarcely distinguish it; and also so fresh, that he is in doubt whether it be really a fossil relic,

or, on the contrary, recent, owing its fossil appearance to having been much weathered. Sir C. Lyell states that the bones of the aurochs (or bison) have been found in the North Cliff in the county of York, in a lacustrine formation, in which all the land and fresh-water shells, thirteen in number, can be identified with species and varieties now existing in that county. To return to the urus of Cæsar and the ancients. We have stated this animal to be characterized by the immensity of its horns,



143.—Skull of *Bos primigenius*. Front view.

and its vast stature, in which former particular it differs materially from the ancient full-maned bison, or Lithuanian aurochs. This urus no longer, as it would appear, exists; but fossil skulls of a species far exceeding the largest domestic ox in magnitude, with the core of massive horns, are abundant in the superficial strata of



144.—Palatal view.



145.—Back view.

Europe. This species is termed by Cuvier *Bos primigenius*; and he carefully distinguishes the skull from that of the fossil aurochs. In a specimen found at Melksham, and described by Mr. Woods, the cores of the horns measured at their widest expansion upwards of four feet; we may easily conceive what must have been the expansion of the horns themselves: the skull, destitute of the lower jaw, and not perfect otherwise, weighed sixty-three pounds. Larger specimens, however, have been discovered. Fig. 143 represents a front view of the skull of *Bos primigenius*; Fig. 144, a palatal view; Fig. 145, a back view; Fig. 146, a profile.



146.—Profile.

This extinct species Cuvier regards as the type of the domestic ox, in which opinion Mr. Bell and most naturalists coincide, at the same time that they consider the "celebrated white wild oxen of Craven, of Chillingham Park, and Scotland, as specifically the same with the common ox; on the contrary, Col. Hamilton Smith and Mr. Swainson regard the white ox of Chillingham Park (*Bos Scoticus* of some authors) as distinct from the common ox. The former regards the Chillingham ox

as a white variety of the fossil species, *Bos primigenius*; while Mr. Swainson believes it to be the descendant of a smaller species belonging to the same genus as the *Bos primigenius* or ancient urus, of which "the skulls exhibit the type of a form essentially different from that of the domestic ox."

"All these skulls," he continues, "are nearly one-third larger than those of the *Bos taurus*; they are square from the orbits to the occipital crest and somewhat hollow at the forehead. The horns, placed at the side of the above crest, show a peculiar rise from their roots upwards; then bending outwards, and then forwards and inwards. No domestic races show this turn; but numerous specimens of inferior sizes, found fossil in the Cornish mines, have this shape, and the wild bull of Scotland, the only example of this type now known to exist, retains it. The domestic oxen, on the contrary, of whatsoever country or breed they may be, have the square concave forehead, with the horns rising from the ends of the frontal ridge. . . . It appears, then, that the ancient urus, or wild bull, was a perfectly wild, savage, and untamable animal: not only does every account handed down from remote antiquity assure us of this, but it is even verified by the only living example of this form we possess, the *Bos Scoticus*, still preserved in one or two of the northern parks. Although domesticated so far as to live within such precincts without absolute unprovoked violence to its keepers, it retains essentially all the savage characters ascribed to the more powerful species mentioned by the ancients."

Now, as to the specific identity of the white oxen of Chillingham with our ordinary breed, we have no doubt on the subject; in size, form, and aspect, they resemble the finer breeds of black cattle, and the query is, not—Are they distinct? but—Are they the descendants of a wild breed, or, on the contrary, the descendants of domesticated individuals, which have resumed their wild character, "from having ceased to feel through many generations the effects of human domination?" We suspect the latter. With regard to Cuvier's *Bos primi-*

genius, granting it to be the *urus* of Cæsar, we are not quite so sure that it was the wild type of the domestic ox. Its vast size, and the extraordinary magnitude of the horns, to say nothing of its ferocity, and the probability that it is to central Asia, rather than to the wild forests of central Europe, that we ought to look for the type of the domestic race (or races?), are sufficient to induce a doubt.

The term *urus* is evidently identical with the terms *auer*, *ur*, *auerochs*, *ure-ox*, the root also of the word *taurus*; and we agree with Mr. Woods in the belief that the *auerochs*, or *ure-ox*, of the ancient Germans, was the *urus* of Cæsar, but that the word, on the extinction of that animal, became transferred to the bison of the ancients, now known as the *auerochs*, and also under names derived from a different root, as *zubr* (Lithuanian), *zimbr* (Moldavian), *bison*, *vison*, *wisont*, and *wisant*, whence *bonasus*, *monasus*, &c.

Besides the *Bos primigenius*, the following fossil species of ox have been named:—*Bos trochocerus* (Hermann von Meyer, subapennine beds; *Bos* (*Bison*) *priscus* (Bojanus), Buffle fossile de Sibérie (Cuv.), *Bos latifrons* (Harlan), Broad-headed fossil Bison and *Bison fossilis*, “*diluvium*” of Europe and North America, bone-caves and bone breccias; *Bos* (*Bison*?) *bombifrons* (Harlan), Big-bone-lick, North America; *Bos Pallasii* (Dekay), *Bos moschatus fossilis*? *Bos canaliculatus* (Fischer)? Siberia and North America; *Bos velaunus* (Robert), Cussac, Haute Loire.

Abundant remains of the ox were found by Capt. Cautley in the Sewalik Mountains, at the southern foot of the Himalayas, between the Sutlej and the Ganges, partly lying on the slopes among the ruins of fallen cliffs, and partly *in situ* in the sandstone, in company with the bones of mastodon, elephant, rhinoceros, hippopotamus, hog, horse (comparatively scarce), elk, deer, several varieties; carnivora, canine and feline (comparatively scarce); crocodile, gavial, emys, trionyx, and fishes. There were also portions of undescribed mammalia.

THE WILD WHITE CATTLE OF CHILLINGHAM PARK

(Bos taurus, var. Scotticus).

Having thus introduced this beautiful breed of cattle to our readers' notice, we shall proceed to a few interesting details respecting its history.

Mr. Youatt, in his admirable work on cattle ('Library of Useful Knowledge'), clearly expresses his belief in the identity of the wild breed with our domestic races, and adds that the slightest observation will convince us that the cattle in Devon, Sussex, Wales, and Scotland are essentially the same breed changed by soil and climate, yet little changed by the intermeddling of man.

"Every one who has had opportunities of comparing the Devon cattle with the wild breed of Châtelherault Park, or Chillingham Castle, has been struck with the great resemblance in many points, notwithstanding the difference in colour." In another place the same writer says, "To the Principality we naturally look for some trace of the native breed of cattle, for the Welsh were never entirely subdued by any of the early invaders. The Romans possessed merely a portion of the country; the Saxons scarcely penetrated into Wales, or not beyond the county of Monmouth. The Welsh long resisted the superior power of the English under the Norman kings, and it was not till late in the thirteenth century that the Principality was annexed to the crown of England. We therefore expect to find more decided specimens of the native productions of our own island, nor are we altogether disappointed. Howell Dha, or Howell the Good, describes some of the cattle in the tenth century as being white with red ears, resembling the wild cattle of Chillingham Castle. An early record speaks of a hundred white cows with red ears being demanded as a compensation for certain offences against the princes both of North and South Wales. If the cattle were of a dark or black colour, a hundred and fifty were to be presented. When the Cambrian princes did homage to the king of England, the same number of cattle, and of

the same description, were rendered in acknowledgment of sovereignty. Speed tells us that Maud de Breos, in order to appease King John, whom her husband had offended, sent to his queen a present from Brecknockshire of four hundred cows and a bull, all white with red ears. Whether this was the usual colour of the ancient breed of Welsh and British cattle, or a rare variety esteemed on account of its beauty, and chiefly preserved in the parks of the nobles, we are unable to determine. The latter is the most probable supposition; and the same records that describe the white cattle with red ears, speak also of the dark or black coloured breed which now exists, and which is general throughout the Principality." As a further point in favour of the probability of the white wild cattle being specifically the same as our domestic races, we select the following quotation from the work above referred to: "The colours of the improved short-horns are red or white, or a mixture of the two, combining in endless variety, and producing very frequently a most brilliant effect. The white, it is very probable, they obtained from an early cross with the wild breed, and whenever this colour shows itself it is accompanied more or less with a red tinge on the extremity of the ear, a distinctive character also of the wild cattle."

Are then the wild cattle of Châtelherault Park, Lanarkshire; of Chillingham Park; Lime Hall, Cheshire; and other places, the descendants, as Mr. Youatt seems to infer, of these white cattle of ancient race, so valued in early times? or are they descendants of the wild breed which at an early period tenanted the great forests of our island, and which, as the forests became cleared and the land cultivated, were gradually thinned, till at length their remnant found in the chace or park of the nobleman that safety which as old denizens of the soil they might well claim, and but for which the breed would long since have been utterly extirpated? Again, was the wild breed which roamed the Caledonian forest, and the great forest north of London, so late as the latter part of the twelfth century, and mentioned by

Fitzstephen, identical with the white Cambrian breed? These are questions more easily asked than solved. One thing is certain—the wild cattle of Chillingham will breed with the domestic race, but the progeny has never been preserved, the calves having been always killed at an early age, from a pardonable desire to keep this ancient race in all its purity; we firmly believe, however, that the cross-breed would be as fertile as any of our domestic varieties.

The author of the article *Bos* in the 'British Cyclopædia' is of opinion that the white cattle in question are domesticated oxen which have run wild, and moreover that they are not descended from an aboriginal stock, but that the race was originally imported by the ecclesiastics from Italy, where herds of wild cattle much resembling them still exist. In this, as in all other theories, authenticated facts as our basis are wanting.

The Chillingham wild cattle are invariably of a creamy white colour, with a black muzzle; the whole of the inside of the ears, and the tip externally, are red; the horns are white, with black tips, very fine and bent upwards. Some of the bulls have a thin upright mane, an inch and a half or two inches long. (Fig. 147.)

The weight of the oxen is from thirty-five to forty-five stone the four quarters (fourteen pounds to the stone); that of the cows, from twenty-five to thirty-five stone. The beef is finely marbled and of excellent flavour.

These cattle are fleet and active: "At the first appearance of any person they set off in full gallop, and at the distance of about two hundred yards make a wheel round and come boldly up again, tossing their heads in a menacing manner; on a sudden they make a full stop at the distance of forty or fifty yards, looking wildly at the object of their surprise; but upon the least motion being made they all again turn round and fly off with equal speed, but not to the same distance, forming a shorter circle; and, again returning with a bolder and more threatening aspect than before, they approach much nearer, probably within thirty yards, when they



147.—Chillingham Bull.

again make another stand, and then fly off: this they do several times, shortening their distance and advancing nearer and nearer till they come within such a short distance that most people think it proper to leave them, not choosing to provoke them further."

The females hide their calves for a week or ten days after birth in some sequestered situation, and visit them two or three times a day. If any person approach the calves, they crouch close, like a hare in form, and endeavour to hide themselves, but when roused exhibit great fury, pawing, bellowing, and butting at the intruder; the females are resolute in the defence of their young, and attack persons discovered near their lair with impetuous ferocity. Formerly the hunting of these animals was conducted with great parade, many scores

assembling on horseback, and hundreds on foot, to witness the sport; but from the number of accidents that happened, and perhaps from the disturbance created among the game, this practice has been long discontinued. The keeper now uses a rifle, and steals upon the animal selected, until within range, and drops it at a single shot.

ENGLISH DOMESTIC CATTLE (*Bos taurus*).

To describe the form, contour, and colour of the domestic ox is superfluous; and all know that within the precincts of our fertile island, affording unequalled pasturage, the animal has ramified into many breeds, which it has been the care of the farmer to improve and modify to his own advantage. Excepting in a few districts, the ox is not employed in our country as a beast of draught, or for the labour of the plough, which it was in ancient times on the Continent, and still is in many countries; on the contrary, it is for its flesh on the one hand, and its milk on the other, that this animal is so valuable; indeed, everywhere the true importance of the ox is in itself, and not its labour, though in many parts of the world it is used both as a beast of burden and draught. Restricting our present observations to British cattle, we may observe that there are two parties immediately, and we may say professionally, interested in the culture of cattle—the grazier and the dairy-farmer; and both require different and, to a certain degree, incompatible excellences. With the grazier, roundness of form, a moderate smallness of bone, depth of chest, and an aptitude to acquire external fat upon a small consumption of food, are among the points of excellence aimed at and expected. On the contrary, the supply of a large quantity of rich milk is the desideratum of the dairy-farmer; and it very seldom happens that the qualities prized by the one party are combined with those required by the other: both therefore attend to their exclusive interests, agreeing only in the care bestowed upon the animals subservient to their respective

purposes. To note every variety and enter into minutiae—the part rather of the farmer than the naturalist—is far from being our object; a sketch however of some of the principal breeds will not be uninteresting as an accompaniment to the pictorial specimens before us.

Among the older breeds was a long-horned race, now greatly modified, of which Lancashire and the West Riding of Yorkshire might be considered as the central district; whence it extended, not to the exclusion of other races, through the midland counties, and even into Ireland. This breed was termed the Craven, from a district of that name in Yorkshire, bordering upon Lancashire, where it is said to have originally appeared. This breed was large, coarse boned, and apt to be long in the body, which besides was destitute of roundness. The milk, if not abundant in quantity, was extremely rich, and suited the purpose of the dairy-farmer. The horns were of enormous length; sometimes they projected horizontally on each side of the head; generally however they swept downwards, with an inward flexure, often reaching below the level of the muzzle, or even meeting before it, so as to interfere with the facility of grazing: we have indeed often seen the points press against the sides of the muzzle, rendering it necessary to shorten them. In the beginning of the eighteenth century various agriculturists commenced a series of attempts towards the improvement of this old breed, which resulted in the establishment of the Dishley or new Leicester long-horn. To the grazier the improvement was most immediately beneficial, but the dairyman preferred the old stock. In process of time however the new breed extended, improving the cattle of the middle and northern counties, and especially of Ireland.

In its turn however this breed has almost everywhere yielded to a middle or short-horned race, and even in Leicestershire, the stronghold of the Dishley breed, few are now to be seen. In Cheshire also—which till recently retained a long-horned breed derived chiefly from the old Lancashire and new Dishley stocks—the Durham or short-horned race has made decided inroads, but with

doubtful advantage as respects the quality of the cheese for which that county is celebrated.

Among the long-horned race must be reckoned the old Shropshire breed, a large-boned and hardy race, well fitted to serve the dairy. It would appear that this breed is seldom to be seen pure, having been crossed with advantage by the short-horned Holderness. In Staffordshire the old long-horned breed has been in most parts superseded by short-horned cattle; it still however maintains its ground in the north of that county, more particularly along the banks of the Trent, and the Dove, close to the borders of Derbyshire. Between the long-horned and the short-horned races of our cattle intervenes a race termed "middle-horns," represented by the North Devonshire, Somersetshire, Herefordshire, Gloucestershire, and Sussex cattle.

The Devonshire breed is of great antiquity, and has been long celebrated for beauty; like most of our other breeds it has become improved during the last fifty or sixty years, and has perhaps now attained to its perfection. The head of the Devon ox is small, but broad across the forehead and narrow at the muzzle; the horns curve gracefully upwards, the chest is deep, and the back straight. The cow is small compared with the bull.

The system of ploughing with oxen is very generally practised in Devonshire, and where the land is not too heavy, no teams of oxen are superior, if equal, to these in this kind of work. It is however to the grazier that this breed is more especially valuable, few oxen rivalling the Devonshire in disposition to fatten and in the quality of the flesh. Generally speaking this breed is inferior to many others for the dairy, not indeed as respects the quality of the milk—for it yields a more than average proportion of cream and butter—but the quantity. Some farmers however have found the North Devons to yield even a large produce of milk, so that in this particular much may depend on choice of pasturage.

In Somersetshire the Devon breed prevails, or at least the original breed has been greatly crossed by the Devon, of which it presents most of the excellences.

The Somersetshire cattle are alike valuable for "the pail, the plough, and grazing." The tract of country between Bridgewater and Cross produces cheese of well-known excellence; the best Cheddar cheese is made either in that tract or the marshes round Glastonbury.

The Hereford improved breed, with white faces, is valuable as fattening rapidly, and that on inferior fare; the flesh is fine-grained, and highly prized in the market: the cows however yield but a scanty portion of milk. In Gloucestershire the Herefords are preferred for the team, and by graziers for fattening; but the old Gloucester breed for milk. This old breed is of mixed origin, consisting of a race of Welsh descent, as is supposed, crossed by various others, and among them the Alderney. The rich Vale of Berkley produces the finest Gloucester cheese.

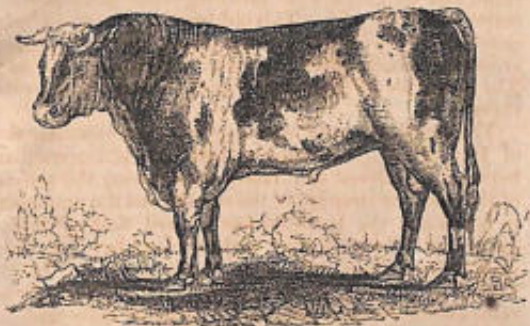
The breed of cattle in Sussex closely resembles that of Devonshire: according to judges it is intermediate between the Devon and Hereford, "having the activity of the first, the strength of the second, and the propensity to fatten and the beautiful fine-grained flesh of both." Its colour is deep chestnut red, or blood-bay, and a deviation from these colours indicates a cross. In the Weald of Sussex oxen of this valuable stock are generally used for team-work; and so great is their strength and quickness, that many teams have been known to travel with heavy loads fifteen miles a-day, for several successive weeks, and that without distress. The Sussex cow, as is the case with the Devon and Hereford, is very inferior in size to the bull; and though the milk yielded is good, it is of trifling quantity.

A valuable breed of middle-horned cattle extends through South Wales, and of this the Glamorganshire variety is highly celebrated. The oxen are readily fattened, and the cows yield a fair quantity of milk. (Fig. 148.)

The most extensively diffused breed of cattle on our island, and by far the most valuable, is that termed, by way of distinction, the short-horned, presenting every point in the highest excellency.

Of this breed England may justly be proud; in it is united as far as possible every good quality. The form is admirable; the oxen fatten quickly, and often attain to an enormous weight, and the cows are excellent as milkers.

It would appear that Durham and some parts of Yorkshire had long possessed a breed of short-horned cattle of large size, and celebrated for the quantity of milk yielded by the cows; but this breed, not only in figure, but in aptitude to fatten and in the quality of the flesh



148.—English Bull.

required great improvement, other races far excelling it in these points, so important to the grazier. This stock still lingers, and is certainly valuable to the dairy farmer, who might however substitute the improved breed for it with advantage. It is about eighty years since the improved stock of this old but really fine breed began to be established on the banks of the Tees, owing to the judgment and care of the intelligent breeders of that district. It differs from the old short-horns in possessing a well-developed figure, and in aptitude to acquire fat. The first step of improvement, resulting from the practical knowledge of Mr. Milbank and other

coadjutors, opened the way for the successful exertions of subsequent spirited breeders, who, by pursuing a judicious plan in crossing, have brought the breed to the highest pitch of perfection. Among these crosses it is supposed that the white wild breed has contributed a share, and to this circumstance is attributed the prevalence of white as characteristic of the stock.

Among the most successful of improvers was Mr. C. Colling, who bred the celebrated Durham ox exhibited in the years 1801-5-6, the produce of one of the ordinary short-horned cows and a bull termed Favourite, of noble figure. At five years old, says the excellent author of the work on cattle, "the Durham ox was sold to Mr. Bulmer, of Harnley, near Bedale, for public exhibition, at the price of 140*l*. This was in February, 1801. He was at that time computed to weigh one hundred and sixty-eight stone of fourteen pounds; his live weight being two hundred and sixteen stone: this extraordinary weight did not arise from his superior size, but from the excessive ripeness of all his points." The Durham ox in a short time passed into the possession of Mr. J. Day, who travelled with him through the principal parts of England and Scotland, till at Oxford, the 19th of February, 1807, he dislocated his hip-bone, and continued in that state till the 15th of April, when he was obliged to be slaughtered, and, notwithstanding he must have lost considerably during these eight weeks of illness, his carcase weighed, the four quarters one hundred and sixty-five stone twelve pounds, tallow eleven stone two pounds, and hide ten stone two pounds.

Among the most remarkable of Mr. Colling's experiments in breeding was that of a cross between the improved short-horns and a polled Galloway cow, which, being interbred with the pure short-horned stock, gave origin to a breed called the *Alloy*, a term at first given by way of disparagement, but continued afterwards when the excellences of the breed were acknowledged. Some idea of its value may be formed from the fact, that at a sale of Mr. Colling's cattle forty-eight animals (cows, bulls, year-old bull-calves, and heifer-calves)

realized 7115*l.* 17*s.* One bull named Comet sold for a thousand guineas.

Of the Alloy breed was the stock, or part of the stock, of the late Rev. H. Berry; the figure of the cows was excellent in every respect, and their milking quality is stated to have been by no means of low degree.

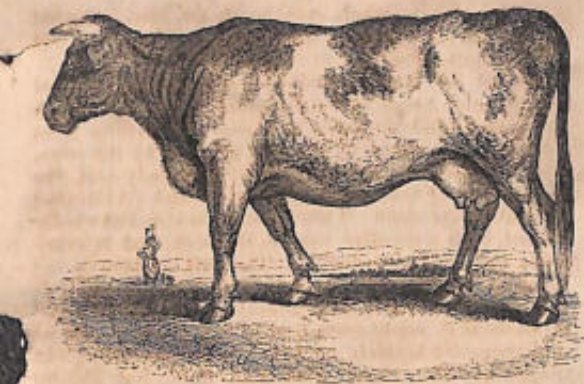
Among the most celebrated of the short-horned stocks of the present day, that in the possession of Lord Althorp, the late Earl Spencer, was one of the most distinguished. It was originally derived from the stock of Mr. R. Colling, and no pains have been spared in bringing it to the highest excellence. A celebrated bull, belonging to this nobleman, and which was known under the cognomen of Firby, may be regarded as a model of the breed. It is a peculiarity in this short-horned race, that the cows are excellent as milkers, and moreover that when dried they fatten rapidly. The oxen, as it is acknowledged, are fit for the butcher at the age of two years; but this tendency to acquire fat renders them indolent workers, and more unfitted for the team than other breeds; a circumstance of little consequence, as cattle which are profitable to the breeder at two years old, and are as ready for the butcher at this age as those of any other breed at three or even four, ought never to be submitted to the yoke. The bulls, indeed, being extremely *double*, may be employed with advantage in many operations going on in every farm, a plan the more advisable as they are apt to acquire too much fat, which moderate labour would tend to diminish.

It must not be supposed that every breed of short-horned cattle is endowed with the qualities characteristic of the improved stock, which render it so valuable. There is, for example, a breed of short-horned cattle in Lincolnshire, with which the Smithfield market is abundantly supplied; but the cattle of this stock are by no means first-rate animals. The head is finely modelled, the bone is comparatively large, the limbs high, and the hips wide. In many instances the stock has been improved by admixture with more highly-bred animals, and rendered valuable, but the flesh is not fine-

grained. On the whole these cattle are better adapted for the dairy-farmer than the grazier, as the cows yield a fair quantity of milk.

Among the short-horned race must be enumerated that singular breed of cattle called Alderneys, which has gained, and deserves, a degree of celebrity from the peculiar richness of the milk afforded by the cows. These cattle are originally from Normandy and the islands on the French coast, from one of which (Alderney) they take their name. They are small in size, awkwardly shaped, with a peculiar bend in the back, and in every point more or less defective. The milk yielded is not great in quantity, but abounds with butter; and it is from its richness that these animals are favourites. Improbable as it might seem from the appearance of the Alderney, its aptitude to fatten is remarkable; even the cows, when dried, soon gain flesh, and acquire considerable weight. It is chiefly in pleasure-grounds and the paddocks attached to the houses of persons not engaged in farming for profit that cows of this breed are to be seen. In Hampshire alone the Alderney breed is general, constituting the stock of the farmer. It would appear that it is more suited to the pasturage of that county than others which require richer grazing-grounds, consume a large quantity of food, and return a disproportionate supply of milk.

Our cut (Fig. 149) represents the Yorkshire cow. With respect to other breeds of which we have as yet said nothing, we may observe that in the Highlands of Scotland a race of small black cattle prevails, of which large herds are driven southwards, and depastured in the grazing-lands of England. Of these numbers are brought to the London market. Of this race many varieties exist. Of these we may particularize the Kyloes of the Western Islands and the Hebrides: they are small, but hardy and well-formed, thriving on coarse fare, and producing fine-grained and high-flavoured meat. The different islands of the Hebrides contain, says Mr. Youatt, "about one hundred and fifty thousand of these cattle, of which it is calculated that one-fifth are annually



149.—Yorkshire Cow.

sent to the mainland, principally through Jura, or across the ferry of the isle of Skye. If these average about 5*l.* per head, the amount will be 150,000*l.*, or more than the rental of the whole islands, which Mr. Macdonald calculated at 106,720*l.*, but which now produce a greater sum. Cattle therefore constitute the staple commodity of the Hebrides. Three thousand five hundred are annually exported from the island of Islay alone."

In the north of Argyleshire the cattle are larger than those of the Hebrides, and are bred to the full size which the pasturage will admit and the good qualities of the animal bear without deterioration. It is in this district that the most perfect Highland cattle are oftenest seen. The animals are compactly built, short, and rather strong in the shank, straight in the back, with a fine muzzle and small sharp horns. As they wander over a wild country, they are wild and often fierce, and their eye expresses energy and spirit. It is solely for their flesh that herds of these cattle are reared: "Every effort," says Mr. Youatt, "to qualify them for the dairy

will not only lessen their hardiness of constitution and propensity to fatten, but will fail in rendering them valuable for the purpose at which the farmer foolishly aims." In the stewartry of Kirkcudbright, together with part of Ayrshire and Dumfries, forming the old province of Galloway, a beautiful polled or hornless breed of cattle exists, highly esteemed for their many excellences. In figure they are admirable, excepting that the neck of the bull is almost too thick; but the chest is deep, the limbs clean and short, the back straight, and the body round. Black is the prevailing colour. These cattle exceed the Argyle breed in size; they fatten well and quickly, and their flesh is excellent: "Few cattle sell so high in the Smithfield market, and it is no uncommon thing to see one of these little bullocks outsell a coarse Lincolnshire bullock, although the latter is heavier by several stone."

The Galloway cattle are remarkable for gentleness; and robust and muscular as the bulls are, one of mischievous habits and bad temper is seldom met with. Ayrshire, Aberdeenshire, Perthshire, and other districts have their peculiar breeds. In Wales several breeds of cattle are found; in the isle of Anglesey there is a fine race of middle-horned black cattle, with a deep chest, heavy shoulders, enormous dewlap, and round body. The appearance of the bulls of this breed is very noble and imposing; the expression of the head is animated, bold, and even fierce; and this character is not lost altogether in the oxen and cows. It is calculated that upwards of ten thousand are annually exported from this island. The flesh of these cattle is of first-rate quality. The numerous inferior crosses or mongrel breeds of doubtful origin, into which the cattle of our island have ramified, need no especial notice.

The annual Exhibition, by the Smithfield Cattle Club, is interesting not only to those immediately engaged in agricultural pursuits, but to every one who reflects upon the importance of the ox in a commercial sense independently of every other consideration. Here are to be seen the results of exertions, principally carried

on during the last eighty years, to unite and bring to perfection the most desirable points in the various breeds of domestic animals which were once peculiar to different parts of Great Britain, but are now spread in their improved form over every part of the country. In the gallery, a portion of which overlooks the show-yard, are to be seen agricultural implements and machinery of the latest and most improved construction; roots and plants adapted to our climate, but which are as yet comparatively unknown; specimens of artificial manures, and of the soils of districts differing from each other in their geological formation. In spite of all the advances which agriculture has made during the present century, how slowly do improvements extend beyond the intelligent circle in which they are first adopted! and it is one of the great advantages of institutions such as the Smithfield Club to spread them more rapidly and widely by drawing the agriculturist from the secluded scenes in which he carries on his occupations, and bringing them before him in the manner best calculated to demonstrate their utility.

A prize ox or sheep is fatter than the ordinary market requires, and hence it is often supposed that the stimulus of prizes for bringing an animal into a state of unnecessary fatness is altogether a work of supererogation. But the power of reaching an excessive size is simply a test. A piece of artillery is tried by a charge greater than is ever required in ordinary practice; and an ox is fattened for exhibition beyond a useful marketable condition, simply to show the capacity of the breed for acquiring, at the least expense of food, and at the earliest age, such a condition as the public demand really renders necessary.

We must now leave the subject of British cattle, and comment upon various species from other portions of the globe.

Figs. 150 and 151.—These delineations present us with an uncouth, savage, half-wild breed of cattle, spread through the Maremma of Italy. The Maremma is a flat strip of country, except in a few places where hills intervene, extending from the mountains of Genoa to the



130.—Driving Wild Cattle in the Maremma.

extremity of Calabria, a length of about seven hundred miles. Its breadth is from the base of the lower range of the Apennine chain to the shore of the Mediterranean. This sweep of country is pestilential in the extreme in summer, and, though it yields the most luxuriant harvests, is only partially brought into cultivation, the greater portion being left for pasture. Here, besides the cattle used as beasts of burden or draught, and employed in the work of the farms, large herds roam unmolested under the care of keepers, which, together with the buffalo-keepers and forest-rangers, are the only stationary population in the wild Maremma. The former, as wild and savage as the animals under their charge, are always mounted on fleet horses, and armed with a long lance, which they use in driving the cattle, and in defending themselves against the fierce bulls, which, as well as the buffaloes, are extremely dangerous. These men are often criminals, who have fled from justice into the Maremma, where they are obliged to sojourn, and are often employed by the proprietors of the farms and cattle, as rangers or drivers. Those who are not fugitives adopt their occupation from choice, which, dangerous and laborious as it is, is one of independence and freedom; they are the analogues of the Arab of the desert, or the Gauchos of the Pampas. Besides being paid for their services, they rear cattle of their own, which they are allowed to feed with the rest. In the summer months they retire to the shady forests along the sea-shore, where the air is not so unwholesome as in the open plains. The cattle are collected at various times, and driven by these men, called *vaccari*, to the fairs held in the towns, for sale. Both the bull and the buffalo are baited in Italy, by men and dogs, for the entertainment of the Roman people, who seem to be as fond of circenses as were their great predecessors. The scene of the sport, which is called *La Giostra*, is, like many other buildings in Rome, a curious compound of the modern and ancient. The *Amfiteatro Correa*, as the place is designated, is situated in the massive cluster of buildings raised upon the site, and partly with the materials, of the mausoleum



151.—Driving Wild Cattle.

of the emperor Augustus in the Campus Martius. The walls of this amphitheatre and the seats are all of modern structure. The arena occupies the platform of the ancient mausoleum, which in other times was cultivated with flowers and rare shrubs, while the pyramid that bore the statue of Octavius rose in the midst. The vaults beneath, which once held the ashes of the Cæsars, are now in part used as dens for the wild cattle that are brought in from the Campagna and other places to be baited. Twice every week during the summer do these exhibitions take place: they begin at five in the evening, and last till dusk.

The men who are to encounter the bulls and buffaloes

are called Giostratori. They are dressed in white, with a red sash round the waist; each bears a short staff with a red pennon at the end of it: they muster in the arena, make their bows to the assembled spectators, and wait the onset of the mighty animal. Among them are generally two or three of great reputation for skill; these are usually vaccari (herdsmen), or buffalari (buffalo-keepers), men brought up from their childhood among the cattle they respectively manage, and familiarized with their habits. The Giostratori from Viterbo have the reputation of excelling all others, and hence the term *Il Viterbese* (the Viterbonian) is used metonymically to designate any celebrated bull-fighter. In the centre of the arena is a strong post firmly fixed, by dodging round which a man may for a considerable time evade the assaults of a bull or buffalo. At a given signal the door of a den is opened, and the bull rushes forth, wildly gazing around him, till, observing the Giostratori, with their scarlet sashes and pennons, he singles out one, and roaring and lashing his tail drives furiously towards him. The man nimbly avoids the charge, others come to the rescue, drawing off the bull's attention from him, and inviting his attack; till the enraged animal, distracted by the number, quickness, and manœuvres of his antagonists, and wearied with vain efforts, ceases the pursuit. The den is then thrown open, and he generally retires of his own accord, as if glad to escape. When the bull, as is sometimes the case, perseveringly follows a man, and presses him hard, he catches hold of one of the iron rings placed at certain distances round the wall enclosing the arena, and by a rapid movement springs to the top, which like a terrace runs round the foot of the lower seats of the amphitheatre. The height of this parapet is six or seven feet, and it requires great agility, strength, and presence of mind, as well as precision, to avoid being pinned to the wall in the act of taking the leap; such accidents sometimes happen, but when the Giostratori see one of their number thus endangered they use every means to divert the bull's attention.



152.—Bull of the Campagna of Rome

The bull (and also the buffalo) is on some occasions baited with fierce dogs of the Corsican breed, resembling our bulldog, and distinguished by the same "tenacity of tooth" and indomitable courage. They usually pin the bull by the nose or lip, but are very frequently tossed in the air, or ripped up, by the sharp horns of the maddened animal. At these exhibitions, strange to say, females are among the spectators, and not less interested than the rougher sex.

Some of the bulls procured in the Campagna of Rome are very noble and spirited animals, of fine figure and great strength.

Fig. 152 represents a bull of the Campagna of Rome. In Spain and Portugal, where extensive wilds and forest-lands afford ample pasturage, large herds of oxen, born in freedom, wander uncontrolled and untroubled, excepting by man, from whom they flee with precipita-

tion, till roused to fury by his assaults, when they attack in turn, and bear upon him with resistless impetuosity. It is from these herds that the Spaniards and Portuguese select the fiercest and boldest for the revolting contests of the arena; while others are tamed, and broken in for the ordinary purposes of husbandry.

We may easily imagine the excitement produced by the chase and capture of a herd of these fierce animals, and the danger to man and horse.

The chase is thus described in the 'Penny Magazine' by an eye-witness who was engaged in it:—

"The Spanish bull-fight has been often described, but that species of bull-fight which, while it affords pastime to the people, subdues the noble animal to be a partaker of the labours of the husbandman, is, we believe, little or not at all known in this country. The peninsula abounds with extensive forest-lands, which, though reaching over a wide extent of country, are sufficiently open to afford pasture and food to herds of wild cattle who roam almost unmolested amongst their shades. The great forest of the Alemtejo is an apt illustration. In this some hundreds of square miles of country are occupied by growing timber; but within its bounds large open spaces exist which serve for pasturages, and occasionally a farm, a vineyard, or an olive-grove may be seen, struggling as it were for existence amidst the vast solitudes. But though occasional glimpses of culture appear, they are far too few and far between to offer any serious check to the increase and independence of the herds which roam around them undisturbed. It was in this forest that I witnessed for the first time the method of capturing the wild bulls. I had received intimation that the village of Alcoxete, on the Tagus, was to be the scene of a bull-fight, and that the villagers for many miles round were invited to join in the hunt, which was to take place on the following day. I accordingly crossed the river in company of about twenty persons, mostly military, each being provided with a long pole, having a small spike fixed in one end, and mounted as inclination or ability suited. When we arrived on the

opposite bank, a little before daybreak, we found about 250 or 300 persons assembled, some mounted on different sorts of quadrupeds, from the noble Andalusian horse to the humble hack donkey, and very many on foot. They were all armed in a similar manner to ourselves. As soon as daylight began to appear we all marched off towards the forest. The morning was peculiarly fine, and the interest of the beautiful scenery was heightened by the varied costumes of the persons by whom we were surrounded. As soon as we had advanced some distance into the wood we halted for the purpose of refreshment, before the arduous and somewhat perilous duties of the day began. After a hasty meal we divided into two parties, one stretching in a long line to the right and the other to the left. We had not advanced far in this manner before we fell in with a herd of cattle having twelve bulls with it, which no sooner descried us than they bounded off with the speed of lightning. The sport had now begun; we put our horses to the utmost speed, threading our way amongst the tall pine-trees as well as we could, and endeavouring by wild cries to drive the bulls towards the other party. At length, after about an hour's chase, some half-dozen of us who were better mounted than the rest came up with them, and commenced the attack with our long poles. The manner was this:—One person riding at full speed gave the bull nearest him a sharp prick with the goad, which it no sooner felt than it turned upon its assailant and gave chase; another horseman then coming up attacked it on the other side, when, leaving the first assailant, it turned upon the second; he in like manner was rescued by a third, and so on. The attention of the infuriated animal thus distracted prevented his escape, and gave time for the other hunters to come up. The bulls were thus at length separated from the herd. A sufficient number having arrived to form a circle round them, we commenced operations for the purpose of driving them towards the town: all the skill of the riders was now necessary, and all the activity possessed by both man and horse, to keep clear from the pointed horns which

on every side were directed against him, as well as to prevent the herd from breaking through the living net with which it was surrounded. This was perhaps the most difficult part, and was attained by keeping each bull separately engaged, and thus preventing united action; for what line was sufficient, armed as we were, to resist the simultaneous rush of these most powerful animals? The continued activity and exertion requisite had knocked up many of the poor jades who had started in the morning, and the circle became smaller and smaller as the day advanced; several, too, had been carried off severely gored and wounded by the horns and feet of the bulls. I however, and the party with whom I started, were resolved to see the conclusion, and, redoubling our efforts, we at length, about four o'clock in the afternoon, succeeded in driving them into an enclosure where were a number of oxen (all at one time wild) with bells, quietly grazing. Here they were kept till required for the next day's sport.

"The square of Alcoxete has been fitted up in the form of an arena, with seats, or rather standing-places, all round; the centre was carefully cleaned, all stones removed, and fresh sand strewed. At one side a cart was stationed for a purpose to be presently described; at the other a pen was fitted up for the reception of each bull as it was to make its appearance, communicating by a door with the place where the herd was enclosed. The difficulty of bringing the bulls from their temporary resting-place to the scene of their humiliation was not less than that of their original capture. Through the forest they had only the trees and shrubs before them, to which they were accustomed; and, if the line of huntsmen alone was sufficient to awaken their rage and terror amidst scenes familiar to them, how much more must those feelings have been excited when passing through the streets of a town crowded with people, the houses gaily decorated with red, blue, white, and green hangings, and greeted with a thousand tongues in the joyfulness of expectation! Twice the terrified and furious herd turned and dashed through the assembled

crowd, tossing and goring all who ventured to oppose them, and twice the circling horsemen brought them back. One fine black bull took to the river and swam out about two miles before a boat could be put off to recapture it. Several of the English soldiers who were quartered near the town swam after it, and one of them, an excellent swimmer, had nearly reached it, when a fishing-boat came up, and, fixing a cord round the bull's horns, towed it in. The soldier, however, was resolved not to have his trouble for nothing, and, mounting on its back, was landed safely amidst the shouts of the spectators. The sport of baiting the bulls for the purpose of taming them began at three in the afternoon, when the heat of the sun had somewhat abated. Six of the wild animals were ushered into the circus, surrounded by a band of mounted picadores, and accompanied by several tame cattle with bells, when one by one they were secured with cords to the cart, and a leathern cap placed on the points of the horns, after which they were all driven into the pen. The circus was then cleared, and the Spaniards entered, gaily attired in the Andalusian costume, the grace and elegance of which must be seen to be properly understood. The hair, which is worn long, is confined in a black silk bag, which is fastened with bows of black riband: the light-coloured velvet jacket, covered with gold lace and silver-gilt buttons, the velvet vest richly embroidered, the lace shirt, red silk sash, velvet breeches, and silk stockings, all harmonising in colour and form, set off the figure to the best advantage and add to the grace and elegance for which the Andalusian is so justly celebrated. These men, of whom there were five or six, are accustomed from their infancy to the dangerous employment of bull-fighting, and the agility and dexterity displayed in evading the furious attacks of the bull are astonishing. After carefully examining the arena they each armed themselves with four short barbed darts, and waited for the coming of the bull: they had not to wait long; the door was thrown open and the animal rushed into the centre, greeted by the shouts and vivas of the spectators.

One of the Spaniards, advancing, invited the attack, when the bull, who at first, bewildered and amazed, had stood tearing up the earth with its feet till almost hid from view by the cloud of dust, lashing itself into fury with its tail, rushed upon its opponent. All who were not accustomed to such spectacles thought the man must inevitably have perished; but just as the long and powerful horns seemed to touch his body he stepped nimbly aside, and, turning smartly round, planted all four darts in the animal's neck just behind the horns. Loud shouts of applause rewarded his dexterity, and the bull, more enraged than ever, ran round the area tearing up the earth and bellowing with rage, until encountered by a second picadore with like success. After the Spaniards had exhausted themselves in exciting the rage of the bull, they quitted the area, and the populace were admitted to throw the bull: this was generally done by one man leaping between the horns, upon which



153.—Bull-fight.

he supported himself in an upright posture till relieved by his companions, who threw the bull to the ground. (Fig. 153.) The cry of 'largo, largo,' was the signal for its liberation, when, some tame cattle being admitted, it was led by them to the pen. Six bulls were thus baited the first day, the other six on the day following. Three weeks afterwards I had these very animals under my charge as baggage-oxen, as tame and gentle oxen as could be desired."

The bull-fights as conducted in the amphitheatres of Spain and Portugal, the lingering relics of those contests in which Rome so much delighted, and which prevailed more or less throughout the Roman empire, have been often described. These sanguinary spectacles are the delight of the Spanish people, and are not only tolerated but encouraged, by the higher classes of both sexes, who find great satisfaction in the torments which the bull endures from the lance of the cavalier, or the horse from the horns of the bull.

The most graphic and spirited description of this "ungentle sport" is that by Lord Byron, in 'Childe Harold's Pilgrimage,' canto i., which we forbear to quote, feeling assured that all are familiar with it. In a note by Sir J. C. Hobhouse the following additional particulars are recorded:—"The magistrate presides, and, after the horsemen and picadores have fought the bull, the matadore steps forward and bows to him for permission to kill the animal. If the bull has done his duty by killing two or three horses, or a man, which last is rare, the people interfere with shouts, the ladies wave their handkerchiefs, and the animal is saved. The wounds and death of the horses are accompanied with the loudest acclamations and many gestures of delight, especially from the female portion of the audience, including those of the gentlest blood." Fig. 154, representing a bull-fight, shows the manner in which—

"the matadores around him play,

Shake the red cloak, and poise the ready brand,"

before dealing the fatal blow which severs the spinal chord at the back of the neck.



154.—Spanish Bull-fight.

Of the effects of such exhibitions on the character of the people nothing need be said; whatever atrocities may be committed by men "nurtured in blood betimes" cannot surprise us.

Within the Arctic Circle the ox gives place to the rein-deer, but in Iceland cattle are reared in great numbers, and are valuable. In size and appearance, excepting that they are seldom horned, they resemble the breeds of the Scottish islands. It would appear that the Icelandish farmers conduct the breeding of their stock on no principles; consequently, there is great room for improvement; nevertheless, the cattle on the whole are handsome, and the cows yield a considerable quantity of milk. In Norway and Sweden cattle are numerous, and also in Russia: as is well known, the main exports from Russia to England are tallow and hides. In that extensive empire vast numbers are reared, principally in the southern provinces; and the markets of St. Petersburg and other towns are supplied by cattle sent from distant parts of the country. The herdsmen live in a state of barbaric simplicity, and are nomadic in their habits; they travel with their herds to Moscow, St. Petersburg, and other places, which depend more upon them for a supply than upon the farmers of the adjacent districts. The following passage in Johnston's 'Russia' conveys a good idea of the Russian cattle-keeper and his herd:—"Along the road," he says, "we passed one or two large droves of horned cattle proceeding to St. Petersburg. We learned that they were brought from the provinces south of Moscow. These cattle are all of a whitish colour, well made, and of about seven hundredweight. Their journey to St. Petersburg occupies three months; they travel from eight to sixteen miles during the night, and are allowed to pasture and rest during the day on the sides of the road. The herds are attended by one or two men, who convey their cooking utensils, baggage, &c., in a waggon drawn by two oxen; and while their numerous herds repose undisturbed under the shade of the delicate birch, they stretch themselves on the ground and pass their time in a true Scythian state. Here are

also seen a few sheep, but of an inferior breed, covered with hair somewhat like that of a goat. This country is not favourable for the pasture of sheep, owing to the coarseness of the grass and quantity of wood. Little or no attention seems to be used in the rearing of any other animal besides the horse: to him alone the Russ devotes his whole attention, and from him he derives his livelihood."

In Wallachia and Moldavia cattle are abundant; in the latter district, indeed, the people continue in a great measure their ancient nomadic habits, making use of the services of the ox as a beast of draught or burden; united in immense caravans, they roam over an immense extent of territory, transporting in tall vehicles of singular construction various articles of produce, provisions, and other things, to the towns scattered at wide distances about the vast plains of Moldavia. Day by day they move cheerfully on, to the slow and measured sound of the footsteps of their oxen, and are often an entire month without seeing a single human habitation. At the approach of evening the caravan halts, the numerous waggons are disposed in the form of a square, and the oxen are turned out to graze at large, under the watchful care of intrepid dogs who accompany the caravan. In the middle of the square a fire is now lighted, at which the conductor prepares his simple repast, and afterwards disposes himself for sleep, sheltered by a warm and heavy coverlid that completely enwraps him. These indefatigable walkers are no less excellent riders: they possess a fine race of horses, which are employed for drawing lighter vehicles, while the heavier waggons are drawn by the slow oxen. There are no high roads in Moldavia; the plain is open, and each traveller chooses his own track, and it is often with difficulty that the oxen can drag their way through heavy ground: storms of wind, rain, or snow make the matter worse, so that a passage can only be achieved by great patience, labour, and resolution. The sketch (Fig. 155) represents a bullock caravan of Moldavia wending its weary way over the vast plains of Moldavia, while lighter vehicles drawn by

VOLS. V. & VI.

Le. de Dordrecht 1840



swift horses are seen in the distance. It is by these caravans that the trade and commerce of Moldavia are carried on, and the towns supplied with grain.

In Switzerland there is an excellent breed of cattle, and in no country are these animals more carefully attended to, or held in greater esteem for their utility, as far as the dairy is concerned. Travellers have frequently noticed their docility and intelligence, which they have at the same time not a little exaggerated. It is customary to hang bells round the neck of the cattle, sheep, and goats, in order that, if they stray among the hills and mountains, the herdsman may be directed by the sound in his pursuit of them, the slightest tinkle being heard at a great distance in those lofty and still regions. The cows selected to bear the bell become accustomed to it from habit, and often, we doubt not, betray signs of uneasiness when deprived of it, but the account given by some writers respecting their feelings borders on the ludicrous. "The cow, whose superior beauty, sagacity, or good conduct seems to calculate her for the leader of the herd, is always on gala days distinguished by the largest and finest toned bell, and the bravest ornamental collar, and so down through all the gradations of good, to the small appendage that marks the indifferently good or clever animal, and the total absence of ornament and distinction which points out the self-willed or vicious. If any cow has been guilty of straying, of unseemly behaviour, breach of discipline, or any vicious trick, the displeasure of the vacher is not testified by blows, but by the temporary deprivation of her bell, and this seldom fails to reduce her to order and prevent a repetition of the offence. It is only necessary to see the cow on a gala day, with her badge of distinction strapped round her neck, and then to see her deprived of it for some reason or other, to be convinced that this is true. She is now gay, good humoured, and frolicsome; then sulky and gloomy." (Latrobe's *Alpenstock*.)

The pastoral economy of Switzerland, which is common to Savoy and other alpine countries, and the annual progress of the shepherds and cowherds with their flocks

and cattle to and from the mountains, are interesting. The richer proprietors and breeders in the Alps possess tracts of pasturages, and sometimes houses, at different heights. In winter they live at the foot of the mountain in some sheltered valley, but this they quit in the spring, and ascend gradually, as the heat brings out vegetation, on the higher lands. In autumn they descend by the same gradations to the valley. Those who are less rich have a resource in certain common pastures, to which they send a number of cows proportionate to their means of keeping them during the winter. Eight days after the cows have been driven up to these common pastures, all their owners assemble, and the quantity of milk each cow produces is accurately weighed. This operation of weighing is repeated one day in the middle of summer, and again at the end of the season. The milk of all the cows has, in the meanwhile, been put together and made into butter and cheese, and this common product is divided into shares according to the quantity of milk each owner's cows yielded on the days of trial.

In some parts of Switzerland, and more particularly in the retired parts of the Forest cantons, the peasants make use of the Alp-horn for the purpose of collecting their herds. This primitive instrument is a tube of wood about five feet in length, of very simple construction: it produces a deep, mellow, and prolonged note, resounding to a great distance, floating over the upland pastures, and echoing from crag to crag and from rock to rock. On hearing the well-known summons, which is regularly given at sunset, the cattle bestir themselves, and wend their way to the chalet, where the peasants are waiting their arrival. The deep note of the Alp-horn heard among the mountains, and multiplied by echoes till the last tone dies away, produces a pleasing impression on the traveller, which he long remembers.

Waggons drawn by oxen, often cruelly overtaken, are the ordinary travelling vehicles of South Africa, and are admirably adapted for the country, which is rugged and mountainous, and generally destitute of any other roads than the rude tracks originally struck across the

wilderness by the first European adventurers. Each waggon is provided with a canvas tilt, to protect the traveller from sun and rain, and is drawn by a team of six, eight, or even twelve oxen, fastened with wooded frames to a strong central trace, or trek-tow, formed of twisted thongs of bullock's hide. The driver, who sits in front, has a whip of enormous length, which he often uses with unsparing severity.

Formerly, indeed, if the account given by Barrow is to be credited, the treatment exercised by the Dutch-African boors to their oxen was brutal in the extreme. The Dutch boors, moreover, made use of very large and clumsy waggons, and delighted in transporting tremendous loads at a time. It was a common sight to see six, eight, ten, or even a dozen pair of oxen yoked to an enormous vehicle. But even this number was inadequate to such burdens as they had to draw, and the resistance of such roads. The most disgraceful cruelties were used to force these poor creatures on their way. Their drivers cut them with knives, and when, worn out, they laid themselves down, and refused to rise, it was a common practice to light fires under their sides, and so force them to go. One of these brutal boors, whose knife had been often employed on the flesh of his cattle, boasted that he could start his team at full gallop by merely whetting that knife on the side of his waggon. Once, as he was exhibiting this experiment, the waggon was overturned, and one of the company, "unfortunately not the proprietor," says Mr. Barrow, "had his leg broken."

When the Dutch took possession of the Cape of Good Hope, they found the Hottentots a pastoral people, possessed of flocks and herds; the oxen were of large size, with the horns long and sweeping forwards and upwards, and they were not only trained for riding, but even as guardians of the flocks and cattle, and as instruments of destruction in battle. The Hottentots, says Kolben, who visited them while they yet retained their name and independence as a nation, "have oxen which they use with success in battle; they call them Bakeleys: every army is provided with a large troop of these war-

oxen, which permit themselves to be governed without trouble, and which their leader lets loose at the appointed moment. The instant they are set free they throw themselves with impetuosity on the opposing army; they strike with their horns, they kick with their heels, they overthrow, they rip up, and trample beneath their feet, with frightful ferocity, all that opposes them; they plunge with fury into the midst of the ranks, and thus prepare for their masters an easy victory. The manner in which these oxen are trained and disciplined certainly does great honour to the talent of these people."

Le Vaillant, who was in South Africa in 1781, saw some of these oxen, which were then, as he states, only used by certain tribes of Hottentots; but he gives the same account of their mode of fighting as Kolben, who also describes the Bakeleys as guardians of the flocks. "When out in the pasture-grounds, at the least sign of their conductors they will hasten to bring back the cattle which are straying at a distance, and keep them herded together; they rush on strangers with fury, whence they are of great service against the Boschmen, or robbers, who may attempt to plunder the flocks. Each kraal has at least half a dozen of these bakeleys, which are chosen from among the most spirited oxen; on the death of one, or when one in consequence of old age becomes unserviceable, in which case its owner kills it, another ox is selected from the herd to succeed it. The choice is referred to one of the old men of the kraal, who is thought to be most capable of discerning that which will most easily receive instruction. They associate this novice ox with one of long experience, and they teach him to follow his companion, either by beating or some other method. During the night they are tied together by the horns; and they are also thus kept tied during the greater part of the day, until the learner has become a good guardian of the flock. These guardians know all the inhabitants of the kraal, men, women, and children, and testify the same respect towards them that a dog displays towards all those that live in the house of his master. There is, therefore, no inhabitant of the

kraal who may not with safety approach the flocks; the bakeleys never do them the least injury; but if a stranger, and particularly a European, should offer to take the same liberty without being accompanied by some Hottentot, he would be in great danger from these guardians of the flock, which usually feed round it, and which would come upon him full gallop. Then, unless he be within hearing of the shepherds, or have fire-arms or good legs, or unless a tree be near in which to climb, he is sure to be killed: it would be useless for him to have recourse to sticks or stones; a bakeley has no fear of such feeble weapons."

Sparmann, who visited South Africa in 1775, was one of the last travellers who found the Hottentots in their original state of pastoral freedom; he mentions a woman who was possessed of sixty milch-cows, and that, on the cattle of the kraal being brought home from pasture, the evening was enlivened by singing and dancing.

The Caffres, Corannas, and other tribes have oxen in abundance, which are employed as beasts of burden. The Corannas are a nomade race, frequently removing with their flocks and herds to fresh pasture-lands: and transporting their mats, tents, and utensils strapped on the back of oxen, which also carry themselves and their wives and children:

"Fast by his wild resounding river
The listless Coran lingers ever;
Still drives his heifers forth to feed,
Sooth'd by the gorrah's humming reed;
A rover still uncheck'd will range,
As humour calls or seasons change,
His tent of mats and leathern gear
All packed upon the patient steer."

PRINGLE.

Burchell thus describes the saddle-oxen of South-Africa:—"These oxen are generally broken for riding when not more than a year old. The first ceremony is that of piercing the nose to receive the bridle; for which purpose they are thrown on their back, and a slit is made through

the septum, or cartilage between the nostrils, large enough to admit a finger. In this hole is thrust a strong stick stripped of its bark, and having at one end a forked branch to prevent its passing through. To each end of it is fastened a thong of hide, of a length sufficient to reach round the neck, and form the reins; and a sheep-skin, with the wool on, placed across the back, together with another folded up, and bound on with a rein long enough to pass several times round the body, constitutes the saddle. To this is sometimes added a pair of stirrups, consisting only of a thong, with a loop at each end, slung across the saddle. Frequently the loops are distended by a piece of wood, to form an easier rest for the foot. While the animal's nose is still sore, it is mounted and put in training, and in a week or two is generally rendered sufficiently obedient to its rider. The facility and adroitness with which the Hottentots manage the ox have often excited my admiration. It is made to walk, trot, or gallop at the will of its master, and, being longer legged and rather more lightly made than the ox in England, travels with greater ease and expedition, walking three or four miles in an hour, trotting five, and galloping on an emergency seven or eight."

In other parts of Central Africa the ox is employed in like manner. Major Denham thus gives an account of its use in the central countries which he visited:—"The beasts of burden," he observes, "are the bullock and the ass. A very fine breed of the latter are found in the Mandara valleys. Strangers and chiefs in the service of the sheikh, or sultan, alone possess camels. The bullock is the bearer of all the grain and other articles to and from the markets. A small saddle of platted rushes is laid on him, when sacks made of goat-skins, and filled with corn, are lashed on his broad and able back. A leathern thong is passed through the cartilage of his nose, and serves as a bridle; while on the top of the load is mounted the owner, his wife, or his slave. Sometimes the daughter or wife of a rich Shoua will be mounted on her particular bullock, and precede the loaded animals, extravagantly adorned with amber, silver rings,

coral, and all sorts of finery; her hair streaming with fat; a black rim of kohal, at least an inch wide, round each of her eyes; and, I may say, arrayed for conquest at the crowded market. Carpets or robes are then spread on her clumsy palfry; she sits *jambe de ça jambe de là*, and with considerable grace guides her animal by the nose. Notwithstanding the peaceableness of his nature, her vanity still enables her to torture him into something like caperings and curvetings."

The ox was one of the first of the domestic animals carried over to America by the early Spanish settlers; there it has multiplied and spread, and indeed in some degree has recovered its original independence. Herds of wild oxen roam the Pampas, where they are hunted and slain for their hides, which form an important article of commerce. These wild herds are in some districts exceedingly numerous; they differ in no respect from their domestic relatives, and are themselves rendered tame without much difficulty. According to Azara, "Captain John de Salazar, born in the city of Pomar in Arragon, transported from Andalusia seven cows and a bull to the coast of Brazil; from thence he conducted them overland to the river Paraña at the place opposite to where it receives the river Mondai. He there constructed a raft, placed the cattle on it, and gave them in charge to a certain Gaëté, whilst he himself went by land to Paraguay. Gaëté descended the Paraña to its union with the river of Paraguay, and steering up this, he safely arrived at the city of Assumption in 1546. He spent many months in this voyage, and as he had only one cow given him for payment, the saying has hence arisen in allusion to the great value of anything, 'It is dearer than Gaëté's cow.' The second founders of Buenos Ayres took, in 1580, some cows from Paraguay, which multiplied in the neighbourhood; and, from want of due care, many of them became wild, and bent their course towards Rio Negro. The Indians of the Cordillera of Chili became acquainted with these animals, which had already attained their boundaries, and they commenced to carry from them herds of tamed cattle to Chili, where the presidents

of this settlement purchased them from these Indians. Those Indians who could not live in their country without some resource, established themselves in the plains which were occupied by these cattle, and some even mixed with the Pampas Indians. In the meantime, the Indians who were unsubdued destroyed the cattle to the south of Buenos Ayres; the Spaniards of those parts, however, did not neglect to take a portion, which they conducted to Cordova and Mendoza, whilst the Spaniards of Buenos Ayres made up entire cargoes of the hides of bulls and cows; for at that time the animal itself was not considered of value, its skin being all that was sought after. The result of all this (and the same will soon take place at Monte Video) was that towards the middle of the century wild cattle no longer existed in the Pampas; and the unsubdued Indians saw themselves under the necessity of stealing the domestic animals, or of making incursions into the estancias of the Pampas. This was the commencement and cause of the bloody war which the Spaniards had with the Indians. The herds of these revolted or wild cattle, which are also called oreillards in the plains of Monte Video, do not pass to the north of the southern establishments of the Guaranis Missions. The following is the account which I have collected of their origin:—The city authorities of Buenos Ayres, in the name of certain of its inhabitants, as is proved by its archives, made at the commencement of the century, contracts, on the one part with the English, for the acquisition of negroes, and, on the other part, with certain Spaniards, who were thus authorised to procure the hides of the animals on the plains situate to the north of the Rio de la Plate on payment to the city of a certain tax, of which the sum total was shared between these Spanish inhabitants, who from this circumstance were called *Actionnaires*. The primitive source of this right or this proceeding is not known, but certain it is that all the inhabitants did not participate in it, and that its produce was the exclusive share of these *Actionnaires*, who were the descendants of the earliest of the original settlers.

“For the elucidation of this affair it is necessary to consult history. We learn from it that Captain Jean Roméro set off from Paraguay, and, with his associates, founded, on the 24th of June, 1552, the city of St. Jean-Baptiste, opposite the spot where Buenos Ayres exists, at the mouth of the river St. Jean, and that the Indians attacked this city, and constrained the inhabitants, in the month of October of the same year, to abandon it with precipitation, and re-embark for Paraguay. There is reason to believe that the haste with which they fled, and the danger surrounding them, did not permit them to take away some cows which without doubt they had, and which they abandoned. In the year 1580, fifty soldiers set off from Paraguay, and founded Buenos Ayres; and it may be presumed that among them were some of those who had been at St. Jean-Baptiste, or of their heirs or descendants, who, on that account, had a right to the cattle in the plains of the same name; and that they were called *Actionnaires*, by way of distinction from those who, not being descendants of the founders of St. Jean-Baptiste, had not a similar right. Such is, in my opinion, the origin of the cattle of the north of the Rio de la Plate, since nothing goes to prove that any inhabitant of the southern parts had anciently transported cows thither; besides which it was very unlikely they should have done so, having, on the one hand, fertile plains in their neighbourhood, and, on the other, but very few vessels. . . . In these countries salt is not given to the herds of cattle, but they require absolutely to have the *barrero*, for so is called a saline or nitrous earth, which the herds of horned cattle, and even other animals, seek with avidity, and without which they fail, and die in the course of four months. From the twenty-seventh degree of south latitude to the Malovine Islands, the horned cattle, as well as other animals, have no need of the *barrero*, because the waters and the pasture-grounds are sufficiently salt; but northward, beyond this latitude, the *barrero* is necessary, and the plains which do not contain it, do not feed either the horse, the ass, the mule, the ox, the goat, or the sheep. The eastern half of the province

of Paraguay is destitute of *barrero*. It would appear that such is the case over the greater portion of Brazil,* which is the reason why so few cattle are reared there, and also why those that are, have, as Buffon observes, a diminutive stature, and ill-flavoured, disagreeable flesh. This author attributes these defects to the use of wild gourds as food in default of pasturage. But, in the first place, there is not a sufficiency of gourds for the purposes alluded to by Buffon; and, besides, there is there neither a barrenness of pasturage, nor any other deficiency than that of the *barrero* or salt. Setting aside this, cattle prosper in any district, even in the low and boggy lands, where good pasturage and pure water are found. But they prosper better in temperate, and even cold situations, as I infer from this that the cattle of Paraguay, although large, do not appear to me to be so large as those of Monte Video, where they occur somewhat larger than at Buenos Ayres. Buffon thinks that these cattle have degenerated, and that these animals are inferior in size to those of Europe. If he had seen the hides which are imported from this quarter, most assuredly he would talk in another manner. In fact, the cattle of Monte Video are, in my opinion, larger than those of Salamanca, although the bulls here are neither so active nor so fierce.

"I am talking of cattle generally, and not of a dwarf race which I have seen in the Corrientes,† which though it is much lower on the limbs, is nevertheless as stout, and even more stout and bulky in the body than the common race. This race, which multiplies, has doubtless originated from the common breed, and if it intermixes with it a mongrel race is the result.

"There are also many oxen in the province of Chiguitos, between the fifteenth and seventeenth degrees of latitude, but I know not their size. I say the same thing with respect to the Malovine Islands, where we

* In some parts of Brazil cattle are reared in great abundance.—See Spix, Koster, &c.

† Province situated at the north-west extremity of the province of Buenos Ayres.

have transported some heads of cattle, which, in 1780, already amounted to the number of 800, and which at present, in 1795 (*old style*), are upwards of 6000. There, neither shelter, nor covert, nor food is given them, and they have learned to dig in the snow in order to get to the vegetation beneath it. This experience is an argument for establishing that horned cattle not only prosper in cold countries, but also that the assertion of Buffon, that they become acclimated with more difficulty in snowy climates than horses, is erroneous.

“Wild cattle are such as live in vast troops at perfect liberty, flying from the appearance of hunters on horseback, and changing their place of abode when it suits them. In comparing these with domestic cattle, I see no difference either in size or anything else; nor is this strange, inasmuch as there is no difference in their general mode of life. . . . A herd of wild cattle become tame in less than a month. The colours of these cattle are limited to dusky, or to reddish on the upper parts, the rest being blackish. Buffon says that the wild cattle of Africa, found at Cape Blanc and at Sierra Leone, are usually brown; and that those of Barbary and Numidia are dusky chestnut, colours which are pretty nearly the same as those above described.” Besides these truly wild herds there are others in a sort of semi-domesticated condition, which are tended by keepers, and constitute valuable property; their hides, tallow, horns and flesh being all in requisition.

“A grazing-ground (*estancia*) of 15,000 *varres* (or yards) in length, and 5000 *varres* (or yards) in breadth, (that is to say, of two square maritime leagues,) can feed, it is said, 4000 head of cattle, under the direction of a superintendent and four men. The ordinary duty of these five individuals, a duty requiring a hundred horses, is to collect the herd once a week, driving them from all quarters to an elevated and open space which is termed the *rodéo* (or circuit). This is not a work of great trouble, because a horseman, shouting as he gallops along, makes them run of themselves towards the *rodéo*, and they do not stop until they reach it. . . . At Paraguay,

where there is much forest-land, the herds of horned cattle take refuge in the woods during the winter, and leave them in September, pursued by gad-flies, and by an infinite multitude of insects. In order that the cattle may be provided with a crop of tender grass the plains are fired; and if it happens that the conflagration encircles a herd of cattle, they dare the flames and dash through; the contrary is the case with horses and mares, which remain in the circle, violently kicking, until they are burnt to death. The horned cattle suffice here for almost every necessary of life; the greater part of the population neither taste bread, nor anything else besides flesh-meat. With the horns are made goblets, spoons, and combs; and with a cork at the large end, the small end being opened, a horn serves as a pitcher;—a vessel to hold water. The inhabitants form out of the hide all sorts of cordage and string, as well as the greater part of their utensils: on these hides they sleep, and with them they cover their cabins. The fat supplies the place of oil (for culinary purposes); of the suet they make soap and candles; the bones are a substitute for fire-wood in many places where the latter is wanting, and they are made to burn by the addition of suet; the skulls are used as chairs in the *estancias*. From the milk they make many various dishes of curds, which though in general not very excellent (because the milk, the cream, and every unctuous particle are removed), might be as good as in Holland: and the same may be said of the butter."

"It is known that from Buenos Ayres and Monte Video 800,000 ox-hides are annually exported to Europe. . . . In order to obtain these hides, some horsemen join together and arrange themselves in two ranks which form an angle; they then press on the two sides a small number of cattle, and one of the horsemen who goes last in the angle hamstring the animals with a knife in the shape of a crescent or half-moon, fastened at the end of a staff. While this goes on the horsemen continue to ride forwards, and when they have thus secured a sufficient number of animals, they retrace their steps; and the person who hamstrung them gives each beast thus maimed

a finishing stroke with a sharp spear, and the horsemen dismount to strip the carcass, sometimes of the fat and suet, but always of the skin: this they do with such dexterity, that some men without assistance will strip twenty-six cattle at a day's work. When a single head of cattle is to be killed for the sake of its flesh, a horseman throws a lasso over its horns or neck, and another does the same over one of its feet; then straining in opposite directions they prevent it from struggling free and so strangle it. Admirable is the dexterity with which, when the animals pass as they rush forwards, the lasso is thrown, so that directed backwards under its feet, the animal at the pleasure of the horseman is entangled either by one foot or by two together."

Such is the origin of the horned cattle of these countries, where they prodigiously multiplied.* Mr. Darwin states, "that from Monte Video the annual exportation is three hundred thousand, and the home consumption from waste very considerable."

It is a singular feature in the history of the New World that so many of our domestic animals there imported should have returned to their primitive independence; the ox, the horse, the hog, the ass, the rabbit, the cat, and the dog, have thus estranged themselves from the control of man. Individuals have at different times escaped from confinement or been neglected; a vast region lay before them, presenting abundance of food; they multiplied, and their offspring in turn; and thus within a brief period have the plains of the New World been peopled by alien races of animals, which claim Asia or Europe as their starting-point.

America is not the only portion of the globe to which, by the agency of man, in modern times, the ox has been introduced. We allude to Australia, New Zealand, and the groups of islands which sprinkle the Pacific Ocean. "With the appearance of Vancouver," says Otho von

* In the Falkland Islands the wild cattle and horses were introduced by the French in 1764; the cattle are magnificent, but the horses small.

Kotzebue, speaking of the Sandwich Islands, "arose the fortunate star of these islands. Among the innumerable benefits he conferred upon them, they are indebted to him for the possession of sheep and cattle; Tameamea (the native king) declared these animals under a tabu for ten years, which allowed time for so large an increase that they now run wild in the forests." Of the benefits resulting from the introduction of the ox into a country naturally destitute of it, nothing need be said; but the gift of cattle to a people who, though yet uncivilized, are yet capable of appreciating their value, is to commence a revolution in their state and condition immeasurably for the better: for the possession of property is one of the bonds of society, and the desire of acquiring it the great stimulus to industry. With the introduction of the ox, the condition of the people of these islands must necessarily be improved. Not only will cattle be reared for home consumption, but for supplying the ships that navigate these seas (whalers, &c.), other valuables being given in exchange; hence will the rearing of cattle be generally undertaken: this involves care and attention, and a state of peace; agriculture and commerce follow, and prepare the way for the arts of civilized life.

To Asia and its border-lands let us turn our attention—regions in which the ox from the earliest epoch has been in a state of domestication, and where this animal, with sheep and goats, constituted the riches of patriarchs, and chiefs, or princes, who deemed it not beneath them to take an active interest in the management of their flocks and herds. In that age of patriarchal simplicity such scenes as that delineated by the pencil of Berghem were not imaginary, and the pastoral poetry of classical antiquity has not only rendered them familiar, but thrown an air of grace and even dignity over them.

In the fourth chapter of the Book of Genesis (ver. 20) we read of Jabal that "he was the father of such as dwell in tents, and of such as have cattle." In the thirteenth chapter of the same book cattle are enumerated as forming part of the riches of Abraham and also of Lot; and in the previous chapter we read that oxen were presented

by the Pharaoh of Egypt, together with sheep, asses, and camels to Abram, during his sojourn in that land. In the eighteenth chapter, veal, or the flesh of the calf, and butter and milk, are mentioned as articles of food. Subsequently abundant mention is made of all these domestic animals, while at the same time we glean that a wild race of oxen long continued to exist in Syria and the adjacent regions; for instance, in the Mosaic injunctions regarding animals to be used as food (Deut. xiv. 5) the wild ox is expressly noticed, and Isaiah alludes also to the wild bull ("as a wild bull in a net"). Hence it



156.—Ox caught in lasso; Egyptian Sculpture.

would appear that though a domestic breed, established at a period antecedent to historic record, the Scripture outline excepted, formed part of the wealth of man in the primeval ages of his history, a wild race still tenanted their aboriginal pasture-lands. Wild oxen are exhibited in the Egyptian sculptures, and the chase of them is often represented: they were sometimes hunted with dogs, the huntsman bearing bows and arrows, and sometimes they were caught with the noose or lasso, as depicted in our outline. (Fig. 156.)

The utility of the ox was well appreciated in ancient times, insomuch that it became an emblematic object of worship among most of the nations of antiquity. The

traditions of every Celtic nation enrol the cow among the earliest productions, and represent it as a kind of divinity. Among the Egyptians the god Apis was worshipped in the form of a bull, and Herodotus describes the ceremonies attendant upon the choice of this bovine deity, to whose honour other bulls chosen by the priests were sacrificed. The goddess Isis was represented by the same people under the figure of a woman with the horns of a cow, as the Grecians represented Io; and the sacrificial offering was a bullock; the cow was never sacrificed, being sacred to Isis. The veneration of the cow was equally prevalent in Libya. The Libyans, says Herodotus, from Egypt to the Lake Tritonis, are breeders of cattle, eat flesh, and drink milk, but abstain from the flesh of cows, as do also the Egyptians, and will not keep swine. Nay, among the women of Syrene, to strike a cow is accounted a crime, because they celebrate the feasts and festivals of the Egyptian Isis. Neither will the Barcean women taste the flesh either of a hog or of a cow.

In India, where in many points the practice and worship of the ancient nations were the same as those of the Egyptians, the ox was held sacred, and still is so by the Brahmins. The religious writings of India say that the cow was the first animal created by the three gods who were directed by the supreme lord to furnish the earth with animated beings. In the sculptures of the cave-temples of Ellora the sacred bull is represented with great truth and spirit. Colonel Tod (*Trans. Royal Asiatic Soc.* vol. ii., p. 560) says, "In Hindu mythology the bull Nanda is at once the guardian of one of the two gates of heaven, of Iswara, or Bal Siva, and his steed." The astronomic allusion thus blended with mythology is evident, viz., the entrance of the sun into the sign Taurus, the equinoctial festival of remote antiquity, and regarded as a jubilee by the Indo-Scythic nations hemming the shores of the Mediterranean to the Indian Ocean." We need not say how the idolatry of the Egyptians affected the Israelites, and mingled itself with the religious ceremonies of other nations, whose



157.—Ploughing with Ox and Ass.

worship required the ox as a sacrifice to imaginary deities. The estimation in which the ox was held, and which led to its consecration, did not arise from the circumstance alone of the cow yielding milk, nor from the value of the flesh of the animal as food, but from its services in agricultural labour.

It was employed as a beast of burden, for the cart, for the plough, and for treading out the grain from the ear. Our pictorial representations present us with many illustrations of its use in these points among the ancients, and which need no detailed description to render them intelligible.

The Mosaic ritual lays down several rules respecting the treatment of the ox: one forbids the yoking together of the ass and the ox in the same plough (Fig. 157), perhaps from the inequality of their size and strength, which would render the draught irregular, and oppress both animals. Another injunction is, "Thou shalt not muzzle the ox when he treadeth out the corn." The first idea suggested by this passage is, that the operation of threshing was effected simply by the feet of the cattle passing over the sheaves; and such indeed was the case in the times of patriarchal simplicity. Afterwards, as other passages show, rollers and wheels of wood, and threshing instruments with teeth, were used: these were drawn over the sheaves by oxen, and greatly facilitated the process. With respect to the primitive mode of threshing by means of the feet of oxen, there is express allusion to it by Homer, which proves that the practice was common in his time and country:—

"As with autumnal harvests cover'd o'er,
And thick bestrewn, lies Ceres' sacred floor,
Where round and round with never-wearied pain,
The trampling steers break out th' unnumber'd grain."
Pope's *Tr. Iliad*, xx., lines of Orig. 495-8.

The ancient Arabs, Egyptians, and Romans, as well as the ancient Greeks, threshed their corn in this manner: Virgil (*Georg.* lib. i.) describes the manner in which the threshing-floor is to be laid down, showing

that nothing like our modern mode of threshing could have been practised. In Syria, Egypt, and Nubia, at the present day, the grain is, as formerly, either trodden out by the feet of oxen or mules, or partly trodden out, and partly crushed out by means of a roller or other machine which the oxen drag after them, and which more or less destroys the straw, and even injures the grain. Figs. 158 and 159 represent two modes of threshing, viz. by the drag and by the sledge. Fig. 158 is formed of a frame of planks or a large block of wood, the under side of which is armed or roughened by flints or pieces of iron. It is drawn over or around the corn, while the driver sits or stands on the frame and guides the oxen. The other, Fig. 159, represents threshing by the sledge, which is fixed on wooden rollers armed with iron rings, and the driver is seated on a kind of chair fixed on the sledge. The oxen being driven about over the corn, the grain is trodden out while the rings cut up the straw into fragments. This instrument is still employed in Egypt and in some parts of Western Asia. It corresponds to one described by Varro, as being in use in his time in Hither Spain (*Hispania Citeriore*), and which



158.—Oriental Threshing with the Drag.



1½. — Oriental Threshing — Ox Sledge.

he calls, 'plostellum Pœnicum,' having been, as he says, introduced by the Carthaginians, who had borrowed it from the Phœnicians.

Our representations of oxen drawing the ploughs in ancient times, and in Egypt at the present day, illustrate many allusions in the sacred and classical writers. The plough was a very simple instrument, as it still continues in the East, and is rather formed for turning up superficially a light soil, than for making deep furrows in heavy land. It appears that the ploughman, to work it effectually, was under the necessity of guiding it with great care, bending over it, and loading it as far as possible with his own weight, otherwise the share would only glide the surface without making a furrow, and the slightest inattention or cessation of his labour would be followed by the dragging out of the share from the earth, or by irregularity in the depth and direction of the furrow; hence the expression of Pliny, "*arator, nisi incurvus, prævaricatur.*"

The cuts afford an interesting exemplification of the progress made in the improvement of the construction of the plough. It was at first drawn by men, and of this practice illustrations exist on some of the Egyptian monuments. The ox was, however, soon pressed into the service of



160.—Ancient Egyptian Ploughing.



161.—Ancient Egyptian Ploughing.

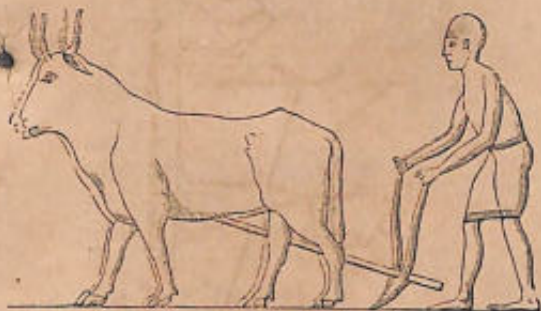


142.—Ancient Egyptian Ploughing.



103. — Two-handed ancient Egyptian Plough.

the agriculturist, and Fig. 160 shows perhaps the simplest form of the application. In this the plough-share is little more than the old hoe, to which a wooden bar is attached which the oxen draw, supplying greater strength, but allowing very insufficient means of guidance, and the depth of the furrow depending altogether upon the strength and skill of the man who held the plough-handle, while the straightness of the furrow depended on the driver of the oxen. In Fig. 161 the form is a little improved. By a slight alteration in the handle, the holder is enabled to use one hand for the whip, and



164.—Ancient Egyptian Ploughing.

thus to guide the oxen himself. The next step was to form a ring-hole or handle to the piece of wood which joined the share, while the pole moved freely in another ring. (Fig. 162.) This enabled the ploughman the more easily to force down the share, and to avoid and regulate the irregular movements occasioned by the unequal resistance of the soil. The two-handed plough (Fig. 163) effected the same purpose more effectually, but though an improvement, it involved the necessity of a separate driver, as both hands were now occupied. In the next stage the hind part was formed



1155.—Modern Egyptian milking.

into two crooked horns, uniting at the bottom into a solid piece with the share, while the pole was still left free to rise or fall. (Fig. 164.) This gave the ploughman a more powerful leverage, and enabled him to regulate far more effectually the depth and straightness of the furrow, while he could still use one hand occasionally to guide the oxen. So constructed, the old Egyptian plough differs but little from that used in parts of France at the present day, and which is called the *araire*. There is no evidence that the Egyptians ever applied the wheel to any of their ploughs. Fig. 166 shows the plough as represented on the shield of Achilles, as given by M. Quatremère de Quincy as the form of the old Greek plough; and Fig. 167 is that of an old European



166.—From the Shield of Achilles.



167.—Ancient Plough.



168.—Modern Syrian Plough.

plough. The plough of the modern Egyptians is less light and certainly less elegant than that of their progenitors (Fig. 165), nor is it so effective as the one we have last described. The modern Syrian plough (Fig. 168) has even more resemblance to the early Egyptian ploughs. Wilde, who travelled in Palestine, says, the plough "resembles the ancient Egyptian plough, and does little more than scratch the soil, making a furrow scarcely three inches in depth." Most of the early Egyptian figures do not show in what way the oxen were attached to the plough, but from Fig. 160 and Fig. 161 it can be seen that it was by the horns. This was not the case with the Hebrews, by whom the yoke was laid on the neck of the oxen, which is also done now both in Egypt and Syria.

The illustrations of the use of the ox in ancient times in Egypt (Fig. 169), and in modern Syria (Fig. 170), as well as in Tartary by the nomadic people (Fig. 171), need no particular comment.

THE ZEBU.

Whether the Zebu breed of oxen be derived, as some contend, from a distinct origin from that of the ordinary ox, we will not attempt to determine; suffice it to say that it presents marked peculiarities which clearly characterize it. Narrow high withers surmounted by a large fatty hump, and arched back rising at the haunches and suddenly falling to the tail, slender limbs, a large pendulous dewlap falling in folds, long pendent ears, and a peculiarly mild expression of the eye, proclaim the Zebu race—a race varying in size from that of our largest cattle to that of a young calf. (Fig. 172.) This breed is spread over India, China, and the Indian Islands; it is also found in Madagascar and on the eastern coast of Africa, in the interior regions, and parts of the western coast, and is used for the ordinary purposes of draught and burden. India appears to be its parent country, and we may readily believe that in remote ages, when an extensive commerce existed between that



169.—Oxen and Carts; from Egyptian Sculpture.



170.—Modern Syrian Cart.

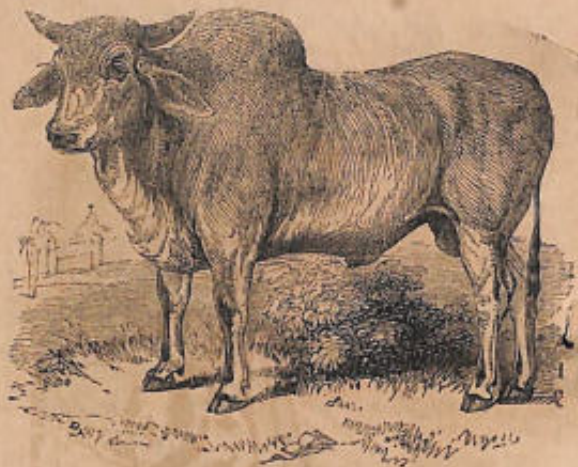
country and Egypt, it was introduced into the land of the Pharaohs. In upper Egypt, Abyssinia, and Ethiopia (Fig. 173) it is now almost exclusively prevalent; but in Lower Egypt, as we learn from Burckhardt, the Zebu or humped race is unknown. In the ancient Egyptian representations of animals, both the humped race and the ordinary ox with long horns are clearly depicted. (Fig. 86.) It is the zebu ox which is sculptured in the cave-temples of Ellora, and the seven pagodas, as they are commonly called, at Mahámalaipur on the Coromandel coast. We have thus proofs of the extreme antiquity of this breed, and of its distinctness at a remote era from the ordinary ox, and that its peculiar characters were what we now see.

Buffon observes that the ox without a dorsal hump (which he erroneously terms the Aurochs race) occupies the cold and temperate zones, and is thinly distributed towards the regions of the south; on the contrary, the ox with the hump (which he terms, also erroneously, the Bison race) exclusively occupies all the southern regions—namely, the entire continent of the Indian empire, the islands of the Eastern and Southern seas, and the whole of Africa from Mount Atlas to the Cape of Good Hope, including Madagascar, and the island of St. Juan on the channel of Mozambique. With respect to the Cape of Good Hope, it is certain that the zebu race does not prevail there, at least in the present day; but F. Leguat (see his ‘*Voyages*,’ &c., 1720) observes that “the oxen are of three sorts at the Cape of Good Hope, all of a large size and very active; some have a hump on the back, others have the horns long and pendent, while others have them turned up and well-shaped, as in English cattle.”

With respect to the ox represented on the Greek and Roman sculptures, which is not of the true zebu race, it must be confessed that in many points, and more particularly in the pendulous folded dewlap, it resembled the zebu, and may probably have been the ultimate product of a mixture of the zebu race, introduced at an early date from India, with the ordinary cattle of Greece and



171.—Bullock Carts of the Nomadic Tartars.



172.—Indian Zebu.

Italy. This, however, is a mere suggestion. In the Greek sculptures the ox is represented without any hump, but the withers are high and the crupper rounded. "To the classical antiquary," says a talented writer, "we beg to suggest that the dewlap of the Brahmin bull offers an object of much attention and interest, by reason of its sharp and decided outline, and perpendicular creases or folds, wonderfully verifying the correctness of those Greek sculptures on bronze and marble, in medals and statuary, in which we see representations of Victory sacrificing a bull, of the oxen of Ceres, &c. These representations will no longer be considered out of drawing by those who may have an opportunity of examining the sacred bull of India, nor exaggerated in their forequarters, although critics of the last century (less fortunate in this respect than the visitors of the Zoological



173.—Zebu and Ethiopian Car.



174.—Zebus of the Zoological Gardens.

Society's gardens) have determined them without hesitation to be altogether incorrect." Several beautiful specimens of the zebu ox, both of the large-sized variety and also of the dwarf caste, are in the Zoological Gardens. They are remarkable for their docility and quiet temper. (Fig. 174.)

Mr. Youatt informs us that a beautiful zebu bull and cow of the Nagore breed were exhibited at the Christmas Cattle-show in 1832, and adds, that they were bred by Lieut.-Colonel Skinner, on his farm at Danah near Pokah, on the borders of the Bichaneer desert, a hundred miles to the westward of Delhi. They were of the highest breed of Indian cattle, used by the higher orders to draw their state-carriages, and much valued for size, speed, and endurance. The specimens in question "arrived at Calcutta, a distance of fourteen hundred miles, in January, 1829, and were then something under

six months old. They were sent as a present to Mr. Wood, who was then residing at Calcutta, and by whom they were forwarded to Mr. Perkins. Colonel Skinner has a large stock of them, and six or seven beasts are always kept saddled, to carry the military dispatches. They remain saddled three or four hours, and, if not wanted in that time, fresh ones are brought out to relieve their companions. They will travel with a soldier on their back fifteen or sixteen hours in the day, at the rate of six miles an hour. Their action is particularly fine, nothing like the English cattle with the sideway circular action of their hind-legs: the Nagore cattle bring their hind-legs under them in as straight a line as the horse. They are very active, and can clear a five-barred gate with the greatest ease. Mr. Perkins has a calf which has leaped over an iron fence higher than any five-barred gate, and the bull frequently jumps over the same fence in order to get at the water, and, when he has drunk his fill, leaps back again." . . . "Mr. Perkins very properly observes, that the chief advantage of these Brahmin bulls would probably consist in their speed and strength, in both of which they surpass any of our breeds."

Of the extensive use and consequent value of the Brahmin or large zebu breed in their native climate we can scarcely form an adequate idea. In some parts of India the dwarf races are unknown, and this is bred exclusively. According to an observation of Colonel Sykes, in the 'Proceeds. Zool. Soc.' the Brinjarees, a singular erratic people, possess vast herds, and breed the Brahmin cattle on an extensive scale; "and an army rarely moves in the field without 15,000 or 20,000 bullocks to carry its grain. Dwarf cattle are not met in Dukhun." The buffalo, however, divides the palm of usefulness with the zebu in the agricultural labours of India, and is preferred for many purposes, on account of his more robust constitution. In the Mawals, or hilly tracts among the Ghauts, this animal supersedes the zebu. "In those tracts," says Colonel Sykes, "much rice is planted, and the male buffalo, from his



superior hardihood, is much better suited to resist the effects of the heavy rains and the splashy cultivation of rice than the bullock. The female is also infinitely more valuable than the cow, from the very much greater quantity of milk she yields." In point of beauty and docility there is no comparison between the heavy savage buffalo and the "Sacred bull of Bramah." Nor is the former ever devoted to Bal-Siva as a meritorious offering. On the contrary, it is common to meet with Brahmin bulls thus devoted, which wander at their pleasure, exempt from the servitude of the yoke, and which are regarded as endowed with a sacred character. (Fig. 175.) The beautiful form and sleek appearance of these fortunate creatures particularly engaged the notice of Bishop Heber. The first which the bishop met in his journey was grazing in a green paddy-field, and was branded on the haunches with the emblem of Siva. He crossed their path tame and fearless, and, seeing some grass in one of the Europeans' hands, coolly walked up and smelt it. These privileged bulls are turned out when calves, on certain solemn occasions, by wealthy Hindoos, as acceptable offerings to the divinity Siva. To strike or any way injure or molest one of them is held as a mortal sin. "They feed," he observes, where they choose, and devout persons take great delight in pampering them. They are exceeding pests in the villages near Calcutta, breaking into gardens, thrusting their noses into the stalls of fruiterers' and pastry-cooks' shops, and helping themselves without ceremony. Like other petted animals, they are sometimes mischievous, and are said to resent with a push of their horns any delay in gratifying their wishes.*

Between this absurd reverence for consecrated bulls and the ordinary treatment of the working ox there is a vast distinction; the latter is harshly and often severely treated. The cow, however, has more forbearance exercised towards her than from the treatment of the ox might be expected. Bishop Heber, speaking of the mode of treading out the corn still practised in India,

* 'Journey,' vol. i., p. 145.



Fig. 16.—Zebu and Indian Car.

relates the following:—"One of the Hindoo farmers was threshing out a small kind of millet by driving oxen over it, round and round in a circle. They were just leaving off work as I came up, and a hind was bringing a large bundle of green Indian-corn, weeded from the thick crop, for their provender. I observed, however, that the animals, during their previous employment were not muzzled, according to the Scriptural rule, at the same time that they were kept so constantly moving, that a few mouthfuls were all they could get. While I was examining this heap of grain, and asking the old man some questions, his cows came for the evening, and pleased him exceedingly, when the cowman ran forward to beat them from my path, by forbidding him to strike them, 'Good! good!' he said, with an air of much satisfaction; 'one must not beat cows.' It seems to me that the tender mercies of the Hindoos towards animals are exhausted on cows (and Brahmin bulls) only; for oxen they have no pity—they are treated with much severity."* That the ox should be severely treated or employed in hard work by the Brahmins seems a sort of contradiction to the principles by which these people profess to be guided; but such inconsistencies are too common to be surprising.

Thévenot, who describes the zebu oxen of India as excellent both for the saddle and draught, adds that some gallop as well as a good horse, and goes on to state that they are equally used for the plough and for coaches and chariots. They are harnessed by means of a long yoke at the end of a pole which is placed on the neck of the two oxen, and the driver holds in his hand the cord which is attached to a small double cord passed through the gristle of the nose, instead of a bit in the mouth, as in the case of the horse. (Figs. 176 and 177.)

It would appear that white oxen are highly esteemed in India, as they have also been in other parts of the world. Olearius (tome i., p. 458) notices the procession

* 'Journey,' vol. i., p. 311.



177.—Zebus and Car.

of an Indian prince, who was drawn in a carriage by two white oxen, which had the neck short and a hump between the shoulders, but which were as lively and active as horses. Bishop Heber observes that the Thakoors, the nobility of the Rajpoots, generally travel in covered waggons drawn by white oxen, whose horns they gild. Tavernier observes, "The two oxen which were harnessed to my carriage cost me nearly six hundred rupees. The reader need not be astonished at this price; for these are oxen of great strength, and which travel journeys of twelve to fifteen leagues a day for sixty days, and always on the trot. When they have done half their day's work they have two or three balls (the size of a penny loaf) of wheaten flour kneaded with butter and coarse sugar; and in the evening their ordinary fare consists of chick-peas bruised and steeped half an hour in water.

Of the docility, activity, and services of the zebu ox in India much more need not be said. Numerous tra-



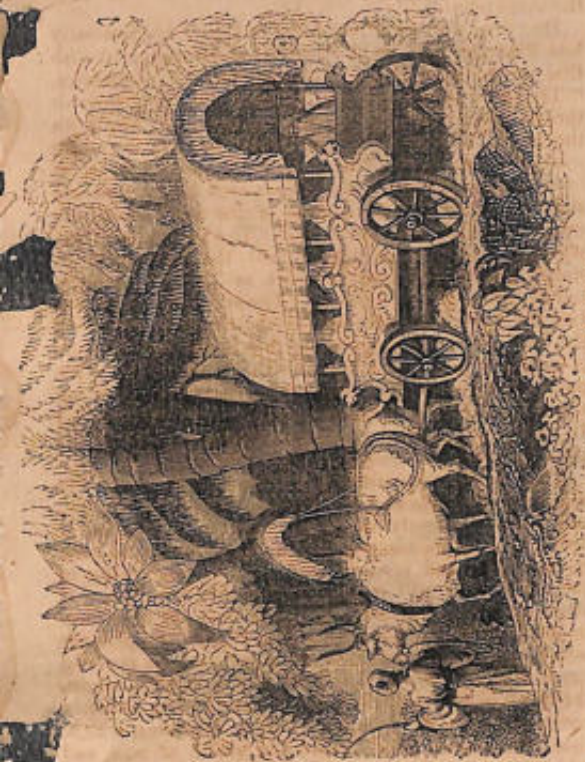
178.—Zebu and Lion fighting.

vellers, both in the past and present century, give the same testimony, and record observations bearing upon the same point.

Receding westward from India to Persia, we gradually lose the zebu race, or at least find it intermingled with that of another type. Chardin (vol. ii.) observes, "The oxen of Persia are like ours, excepting towards the frontiers of India, where they have the hump on the back. Throughout the whole country, the ox is seldom eaten as food; it is only reared as a beast of burden or for tillage. Such as are used for burdens are shod with iron in consequence of the stony mountains over which they have to travel." The shoeing of oxen, where the country is rugged, and the roads hard or stony, is also practised in India, as Thévenot relates, but is not a general custom. The shoes are light, and two are placed on each foot, as the cloven character of the hoof necessarily requires, so that the natural freedom of each part is not impeded. In Persia the bull is often made to fight with the lion, and sometimes comes off victorious, though dreadfully lacerated. (Fig. 178.) In some parts of Turkey also the zebu is used for drawing the carriage or arabah. (Fig. 179.)

Thus much respecting the distinction between the zebu race of cattle and the ordinary breeds of Europe, and their apparently natural distribution. Whichever breed or race we contemplate, we shall find it adapted to the service and necessities of man, its value being in proportion. It will readily be admitted, however, that the interest which attaches to the ox does not arise from its intelligence, but from its absolute utility: the pleasure which the mind experiences when we gaze on peaceful herds feeding in tranquil security is of a complex origin, the result of an association of ideas more or less remotely connected with the presence of these creatures, which, time immemorial, have formed the wealth of man, and which have therefore engaged alike the attention of the statesman, the poet, and the philosopher.

Fig. 180 represents the simple but efficient mode adopted in Normandy of preventing the cow, by means



179.—Zebu and Turkish Arabah.

of a sort of martingale, from nibbling and breaking down the lower branches of the apple-trees with which the vast corn-fields of that district are studded, or which form extensive but unfenced orchards. The apple is there greatly cultivated for the sake of cider, the "bon cidre de Normandie" being greatly celebrated.



180.—Cow with Martingale.

THE GAYAL (*Bos Gavæus*).

Gavaya, Sansc.; Gavāi or Gayāl, Hind.; Gobaygoru, Beng.; Gaujangālī, Pers.; Méthanā, Mountaineers (Cúcis, &c.) east of Silhet; Shiāl, Mountaineers (Cúcis) east of Chatgaon; J'hongnua, Mugs; Núec, Burmas; Gauvera, Ceylon.

India presents us with several species of wild oxen, independent of such as belong to the buffalo tribe, some of which are domesticated in certain districts, beyond which they are not dispersed; such is the Gayāl. Ac-

According to Mr. Macrae, the gayál is found wild in the range of mountains that form the eastern boundary of the provinces of Arracan, Chittagong (Chatgaon), Tipura, and Silhet. The Cúcís, or Lunetas, a people inhabiting the hills immediately to the eastward of Chatgaon, have herds of them in a domesticated state. The animal is called Gabay in the Hindu Sástra, but, as it would appear, is little known beyond the limits of its native mountains, except to the inhabitants of the provinces above mentioned. We learn from the same author that the gayál is of a dull heavy appearance, but that its form at the same time indicates great strength and activity, like that of the wild buffalo. Its disposition is gentle, and in a wild state on its native hills it is not considered dangerous, never standing the approach of man, much less sustaining his attack. The Cúcís hunt the wild animals for the sake of their flesh. The gayál is a tenant of the forest, and prefers the tender shoots and leaves of shrubs to grass: it never wallows in the mud like the buffalo. In a state of domestication among the Cúcís, it does not undergo any labour, nor is the milk of the female, which though small in quantity is extremely rich, held in any request: the animals are bred and reared solely for the sake of their flesh and hides, of which latter the Cúcís form strong shields. These domesticated herds roam at large in their forests during the day, but return home to their villages in the evening, being taught to do this very early by being fed when young every night with salt, of which these animals are very fond. Though the Cúcís slaughter the domestic gayál, the Hindus in the province of Chatgaon will not kill this animal (their gabay), which they hold in equal veneration with the cow, but they hunt and kill another gayál (as l'gáyál, or Seloi), as they do the wild buffalo.

The cry of the gayál is a kind of lowing, shriller, but not so loud as that of the European ox, without any resemblance to the grunt of the buffalo.

The gayál is nearly of the size and shape of the English bull; it has short horns, which are distant at

their bases, and rise in a gentle curve upwards and outwards, their transverse section near the base ovate; the forehead is broad, and crowned with a tuft of lighter coloured, long-curved hair; the dewlap is deep and pendent; there is no mane, or hump, as in the zebu, but the withers rise to a considerable elevation. The tail is short, the body covered with a tolerable coat of straight dark-brown hair; on the belly it is lighter coloured, and the legs and face are sometimes white. The form of the animal and the way in which it carries its head will be understood from our cut (Fig. 181), which is reduced from that by a native artist, prefixed to Mr. Colebrooke's paper on this species, in the 'Asiatic Researches' (vol. viii.).

From various experiments it is proved that the domestic gayâl will breed with the ordinary zebu cattle in India; but whether the offspring will interbreed with each other has yet to be ascertained.

Fig. 182 is the head of the true wild gayâl, or, as the natives term it, Aseel Gayâl, from a drawing by General Hardwicke: the specimen was a female from the south-east frontier of Bengal.



181.—Gayâl.



182.—Head of Wild Gyal.

THE GYALL (*Bos frontalis*, Lambert).

In the seventh volume of the 'Linnæan Transactions' will be found the figure and description of a Gyal (which died in London in 1802), by A. B. Lambert, Esq., who quotes the following letter from George Harris, Esq., this latter gentleman being well acquainted with the domestic gyall in its native country: referring to a communication from Mr. Lambert, he writes, "I have before me your note, with the drawing, which appears to me to be the figure of the animal I mentioned to have in my possession. Some parts of the drawing seem to be rather too much enlarged, as the base of the horns and the rising between the fore-

shoulders. The animal I described to you, and which I have kept and reared these last seven years, and know by the name of the gyall, is a native of the hills to the north-east and east of the Company's province of Chittagong, in Bengal, inhabiting that range of hills which separates it from the country of Arracan. The male gyall is like our bull in shape and appearance, but I conceive not quite so tall, and of a blackish brown



183.—Head of Gyall.

colour; the horns short, but thick and strong towards the base, round which, and across the frons (chaffron), the hair is bushy, and of a dirty white colour. (F. 183) The chest and forehead are broad and thick. He is naturally very bold, and will defend himself against any of the beasts of prey. The female differs little in appearance: her horns are not quite so large, and her make is somewhat more slender; she is very quiet, and used for all the purposes of the dairy, as also (I have been informed by the natives) for tilling the

ground, and is more tractable than the buffalo. The milk which these cows give has a peculiar richness in it, arising, I should conceive, from their mode of feeding, which is always on the young shoots and branches of trees, in preference to grass. I constantly made it a practice to allow them to range abroad amongst the hills and jungles at Chittagong during the day to browse, a keeper attending to prevent their straying so far as to endanger losing them. They do not thrive in any part of Bengal so well as in the afore-mentioned province, and in the adjoining one, Tipurah, where I believe the animal is also to be found. I have heard of one instance of a female gyall breeding with a common bull."

Lesson, and the author of the article 'Ox' in the Penny Cyclopædia, seem to regard the Gayāl and the Gyall as distinct; from the descriptions, however, which are given, it is quite evident that they relate to one and the same species, as Fischer, in his 'Synopsis Mammalium,' considers them to be. The title *frontalis*, therefore, must be retained by right of priority over



184.—Jungly Gau.

Gavaus. Among the synonyms given by Fischer, are, "*Bos Bubalus Gauvera*, Pennant, 'Quadr.'; *Gauvera*, Knox, Ceylon; *Bantinger Javan*, and *Bos Sylhetanus*, F. Cuvier. The *Bos Sylhetanus*, the Jungly Gau, and the Aseel Gayâl, are then identical."

Fig. 184 is a representation of the male Jungly Gau, or Aseel Gayâl (*Bos frontalis*, Lambert; *Bos Gavaus*, Colebrooke; *Bos Sylhetanus*, F. Cuv.).

Duvaucel, who hunted this animal at the foot of the Silhet mountains, describes it as very wild, but easily domesticated; he states, that until he had opportunities of seeing it in a state of nature, he entertained the opinion that it did not differ essentially from our domestic ox, his impression being received from an inspection of specimens living tame in the menagerie at Barackpore: subsequently he regarded it as distinct.

THE GOUR

(*Bos Gour*, Traill, in 'Edinb. Phil. Journ.' Oct. 1824).

Of this noble species of wild ox we are able only to give a figure of the horns from a drawing by General Hardwicke. (Fig. 185.) The gour to which they belonged was killed, as General Hardwicke believed, by the same hunting-party described by Capt. Rogers, and the horns were presented to the General by the principal member of that party, the late Major Roughsedge. These horns were fifteen inches between the tips; their colour is horn-gray, with black and solid tips, which are extremely sharp. A fine pair are in the museum of the Zoological Society of London.

According to Capt. Rogers, the gour occurs in several of the mountain-districts of Central India, but is chiefly found in Myn Pât, or Mine Paut, a high insulated mountain with a tabular summit in the province of Sergojah, in South Bahar. "This table-land is about thirty-six miles in length, by twenty-four or twenty-five miles in breadth, and rises above the neighbouring plains probably two thousand feet. The sides of the mountain slope with considerable steepness, and are furrowed by

streams that water narrow valleys, the verdant banks of which are the favourite haunts of gours. On being disturbed they retreat into the thick jungles of saul-trees which cover the sides of the whole range. The south-east side of the mountain presents an extensive mural precipice, from twenty to forty feet high. The rugged slopes at its foot are covered by impenetrable green jungle, and abound with dens formed of fallen blocks of rocks, the suitable retreat of tigers, bears, and hyænas. The western slopes are less rugged, but the soil is parched and the forests seem withered by excess of heat. The summit of the mountain presents a mixture



185.—Horns of Gaur.

of opens, lawns, and woods. There were once twenty-five villages on Myn Pât, but these have been long deserted on account of the number and ferocity of the beasts of prey. On this mountain, however, the gour maintains his seat. The Indians assert that even the tiger has no chance in combat with a full-grown gour, though he may occasionally succeed in carrying off an unprotected calf. The wild buffalo abounds in the plains below the mountains, but he so much dreads the gour, according to the natives, that he rarely attempts to invade its haunts, and the hunting-party only met with three or four urnas (arnees) on the mountain.

The forests which shield the gour abound, however, with hog-deer, saumurs (Sambur deer), and porcupines."

It was in these wild and romantic retreats that Capt. Rogers and party hunted the gour, which when wounded turns round upon his adversary, ready to do battle. A short bellow imitated by the syllables ugh-ugh, was the only cry which the animal was heard to utter, and that not until it had been struck by the bullet. The gour is gregarious, herding together in parties varying from ten to twenty; they browse on the leaves and shoots of tender trees and shrubs, and also graze on the banks of the streams. In cold weather the saul-forests are their places of concealment, and the heats bring them out to feed on the green lawns and valleys. They do not, it seems, wallow in swamp and mire, like the buffalo. If the natives are to be credited, the gour will not brook captivity, and even when captured at an early age the mountain-calf droops and dies. The period of gestation is stated to be twelve months: the females produce their young in August. The native name of the bull-calf for the first year is Purórah, of the cow-calf Paréeah. The full-grown cow is termed Góúrin.

The gour attains to a very large size: Dr. Traill gives the dimensions of one not fully grown, which measured from the nose to the end of the tail nearly twelve feet, and stood nearly six feet high at the withers; the limbs are vigorous, clean-made, and more deer-like than bovine; the back is strongly arched, and when the animal stands still, the line from the nose to the base of the tail, along the spine, presents a nearly uniform curve. This appearance is partly owing to the curved form of the chafron, and still more to a remarkable ridge of no great thickness, which rises six or seven inches above the general line of the back, from the last of the cervical to the middle of the dorsal vertebræ, where it gradually declines and becomes lost. This elevation is very conspicuous in gours of all ages, although they were loaded with fat, and has no resemblance to the hunch found on the withers of the zebu breed of cattle. There is not a trace of the dewlap, which is well marked in the gayál.

The hair of the skin generally is short and sleek, having somewhat the oily appearance of a fresh seal-skin. The colour is deep brownish black, almost approaching to bluish black; between the horns is a tuft of curling dirty white hair, and over each hoof is a ring of the same colour.

THE YAK.

We may here briefly notice a species of the bovine race, the Yak of Tartary (*Bos grunniens*), too remarkable to be altogether omitted in our sketch of the Ox tribe. Whether the Yak belongs to the restricted genus *Bos* is very doubtful; in some points it certainly is related to the musk-ox (*Ovibos*), at least if we are to judge from the skins, more or less imperfect, which we have had opportunities of examining. The following is the description of a skin, wanting the horns and limbs, in the Zoological Museum, London:—

Nostrils narrow, converging below, with a small naked space between them, and a narrow naked border round them, so that there is no true broad naked muzzle, as in the common ox; the ears are small and pointed; the forehead is covered with black, curling locks, but its degree of convexity cannot be accurately determined, owing to the absence of the skull. The back is covered with smooth hair, of a deep chocolate brown, a white stripe occupying the ridge of the withers, and another the centre of the croup. From the shoulders, sides, and under surface of the body, and also from the inside of the thighs, hangs a pendent mane of long hair, falling in huge masses so as to cover the limbs and almost touch the ground. This mane is grizzled black, except a central line along the belly, of pure white. The tail is tufted with a huge mass of glossy white and rather coarse hairs, 18 or 20 inches in length. In size the animal could not have exceeded the small Scotch breed of cattle.

On the authority of Gmelin and Turner, the horns are round, small, pointed, and bent in a semicircle forwards. The withers are elevated, and the colour is said

to vary. We have seen an example in which the tail was black.

The yak is a native of the mountains of Thibet, and when wild is said to be savage and dangerous; it is, however, reclaimed, and a domestic breed is kept by the natives of the range tenanted by the animal in its wild condition. The yak is perhaps the *Poephagus* described by *Ælian*; from an early period its tail was used as a standard by the Mongols and Tartars, being one of the distinguishing insignia of superior officers. In India these tails are mounted on ivory or silver handles, and, under the name of chowries, are used to brush away the flies; elephants of state are taught to carry a splendidly mounted chowrie in their proboscis, and wave it backwards and forwards.

Of the habits of the yak in a state of freedom little or nothing is known. As regards the domestic yak, *Turner*, in 'Account of an Embassy to China,' after giving a description of it, observes that "these cattle, though not large-boned, seem, from the profuse quantity of hair with which they are provided, to be of great bulk; they have a downcast heavy look, and appear, what indeed they are, sullen and suspicious, discovering much impatience at the near approach of strangers. They do not *low* loud, like the cattle of England, any more than those of Hindustan, but make a low grunting noise, scarcely audible, and that but seldom, when under some impression of uneasiness. These cattle are pastured in the coldest parts of Thibet, upon the short herbage peculiar to the mountains and bleak plains. The chain of mountains situated between the latitudes 27° and 28° N. lat., which divides Thibet from Bootan, and whose summits are mostly clothed with snow, is their favourite haunt. In this vicinity the southern glens afford them food and shelter during the severity of winter; in milder seasons the northern aspect is more congenial to their nature, and admits a wider range. They are a very valuable property to the tribes of itinerant Tartars called *Duckba*, who live in tents, and tend them from place to place; they at the same time afford their herdsmen an

easy mode of conveyance, a good covering, and wholesome subsistence. They are never employed in agriculture, but are extremely useful as beasts of burden, for they are strong, sure-footed, and carry a great weight. Tents and ropes are manufactured of their hair, and amongst the humbler ranks of herdsmen I have seen caps and jackets made of their skins. The best requital with which the care of their keepers is at length rewarded for selecting them good pastures, is in the abundant quantity of rich milk which they give, and in the butter produced from it, which is most excellent. It is their custom to preserve this in skins or bladders, and the air being thus excluded from it, it will keep in this cold climate throughout the year; so that after some time tending their herds, when a sufficient store is accumulated, it remains only to load their cattle and drive them to a proper market with their own produce, which constitutes to the utmost verge of Tartary a most material article of commerce."

Genus ANOA:—

THE ANOA (*Anoa depressicornis*).

* Our figure represents the horns of this rare animal, which has been considered by some naturalists as belonging to the antelopes, by others to the Ox tribe (Fig. 186): this uncertainty arises from the circumstance that though the animal has been noticed for many years, only a few fragments of skulls and horns have hitherto been brought to Europe.

The horns are erect, perfectly straight, and in the plane of the forehead; they are about the same length as the head, that is, about nine or ten inches, strongly depressed or flattened in front, of nearly the same breadth till within three inches of the extremities, whence they are rather attenuated to the tips, which are bluntly pointed, and irregularly wrinkled, or rather crumpled throughout the greater part of their length. The head is long and narrow, terminating in a broad muzzle.

Mr. Pennant is the first naturalist who has mentioned this animal, but he has given no account of its characters, and merely relates, that it is about the size of a middling sheep, is wild and fierce, and resides in large herds among the rocky mountains of the island of Celebes. He considers it as a small species of wild buffalo, and adds, that it is captured only with great difficulty, and is so fierce in confinement, that some of these animals,



186.—Horns of Anoa.

belonging to Governor Loten, in one night ripped up the bellies of fourteen stags which were kept in the same paddock with them. The next author who mentions the anoa from original documents or personal observation is Colonel Hamilton Smith, who in the fourth volume of Griffith's translation of the '*Règne Animal*,' describes

the head and horns, and considers the animal as a species of antelope. Colonel Smith's fragment was brought from Celebes by the late Dr. Clarke Abel, who obtained it on his return from China in the suite of Lord Amherst; but since that period various other heads have been brought to Europe, some of which are deposited in the British Museum and in the collection of the London Zoological Society.

GENUS BUBALUS.

THE ARNEE, OR URNA

(*Bos Arni* of Shaw and others).

The Arnee is by some naturalists regarded as nothing more than the wild ordinary buffalo; but we are inclined to the opinion that it is a distinct species, as we think is clearly evidenced by the characters of the horns, which are not uncommon in museums, though no specimen of the animal itself exists in Europe. It tenants the high lands of Hindustan, and is known in Bengal and the neighbouring provinces by the name of Urna. It is described as a large and formidable beast, conspicuous for strength, courage, and ferocity. The horns of this animal, which we have figured (Fig. 187), are remarkable for their enormous size, often measuring from four to six feet in length. They rise upwards, first inclining outwards and backwards, and then, arching gradually towards each other as they proceed to the points, form together a bold crescent; they are compressed on their anterior and posterior surfaces, and rough with numerous transverse furrows and ridges. The chaffron is narrow and convex.

THE COMMON BUFFALO (*Bos Bubalus*).

The buffalo has been long domesticated in India, where its services as a beast of draught and burden render it extremely valuable. From India it has spread into Egypt, Greece, Italy, and Spain.



187.—Horns of Arnee.

The buffalo differs materially in its form and general aspect from the ox, being a heavier and more clumsy animal, as well as more powerful. Though lower in stature than the bull, it is more massive in the body, which is supported on short, thick, solid limbs; the hide is coarse and dense, covered rather sparingly with black wiry hair. The head is large, and carried with the muzzle projecting; the forehead is convex, the muzzle large; the horns are compressed, and lie back, turning up laterally and often attaining to a large size, but the direction seldom allows the points to be used for goring; the ears are large and pendulous; the dewlap is small; the

eyes are wild, savage, and malicious in expression; the tail is long and slender.

In its native regions the buffalo is a formidable animal, and capable of contending with the tiger, which is often foiled in the deadly strife. (Fig. 188.) When excited, the beast rushes desperately on its foe, strikes him down with the horns or forehead, kneels upon him, crushing in his chest, and then tramples on the lifeless body, as if to satiate its vindictive fury. Its natural temper, indeed, renders it difficult to tame and difficult to manage, while its prodigious strength and adaptation for certain localities render it a valuable acquisition.

The following remarkable instance of the sagacity, courage, and attachment of the buffalo is taken from the Singapore 'Free Press' of April 13th, 1848:—"In the month of March an occurrence took place in the division Modjokerto (residence of Sourabaya) which deserves to be brought to general notice, as a new and striking proof of the attachment of animals towards their purveyors. The local authorities of the division have inquired into the truth of the facts mentioned below; there cannot, therefore, be the least doubt about the matter. On the 14th of March a boy eight years of age, in the Dessa Gilang, was herding some buffaloes in a wood not very distant from the village, when he was unexpectedly seized and dragged away by a tiger. At the cries of anguish uttered by the boy two buffaloes immediately came running up, one of which attacked the tiger with such success that he released the boy and seized the buffalo above the knee-joint; on which a short fight ensued between the buffalo and tiger, which ended in the flight of the latter. In the meantime the other buffalo had placed himself above the body of the boy, which was lying on the ground, in such a way as to cover it entirely and to protect it against a second attack of the tiger. The people in the neighbouring Dessa had in the meantime armed themselves and pursued and killed the tiger. The life of the boy, although he was severely wounded by the tiger on the right thigh bone, is not yet despaired of. The peculiar



188.—Tiger and Buffalo.

attachment which the two buffaloes in this case showed towards their herd, is explained by the circumstance that for the most part the young natives, who take care of the pasturage of these animals, bestow extraordinary attention on one or more of their flock, that they generally remain in their vicinity, and sometimes pass a large portion of the day on their backs."

The hot morass teeming with pestilence is the genial abode of the buffalo, and its delight is to wallow in the stagnant water, where it will luxuriate for hours during the heat of the day, with its black muzzle just elevated above the surface. Its flesh is hard and unsavoury, but the milk of the buffalo-cow is of peculiar richness, and in the East a considerable quantity of butter is procured from it. The hide is greatly esteemed for its solidity and toughness. Colonel Sykes states that the long-horned variety of the buffalo is bred in great numbers in the Mawals, or hilly tracts along the Ghauts: "In those tracts much rice is planted, and the male buffalo, from his superior hardihood, is much better suited to resist the effects of the heavy rains and the splashy cultivation of the rice than the bullock. The female is also infinitely more valuable than the cow, from the very much greater quantity of milk she yields."

Dillon states that the buffalo at Malabar is larger than the ox, with white eyes, and flat horns often two feet long; its legs are thick and short: "It is an ugly animal, almost destitute of hair, goes slowly, but carries very heavy burdens. Herds may be seen, as of common cows, and they afford milk which serves to make butter and cheese; their flesh is good, though less delicate than that of the ox: the animal swims perfectly well and traverses the broadest rivers; besides the tame ones, there are wild buffaloes, which are extremely dangerous, tearing men to pieces, or crushing them with a single blow of the head; they are less to be dreaded in the woods than elsewhere, because their horns often catch in the branches and give time for the persons pursued to escape by flight. The skin of these animals serves for an infinity of purposes, and even cruses are made of

them for holding water or liquors: the animals on the coast of Malabar are almost all wild, and strangers are not prevented from hunting them for their flesh." In Ceylon, as in Malabar, the buffalo exists both in a wild and domesticated state, and the tame herds are not unfrequently joined by wild individuals, which the inhabitants sometimes entrap and at other times shoot. Buffaloes, it would appear, are more common in Bombay than in Bengal. At Boitpoor, Bishop Heber was shown a white buffalo, probably an albino, which was pointed out by the Indians as a rare curiosity.

From India the buffalo is distributed throughout Siam, Cochin-China, Malacca, and the adjacent islands, as Sumatra, Java, Borneo, &c., together with the Philippines; it is also common in China, where it is used in the various labours of agriculture.

Mr. Marsden, in his valuable History of Sumatra, has given a minute description of the breed of buffaloes in that island.

The Carbow, or Sumatran buffalo, constitutes a main part of the food of those eastern islanders, and is the only animal they employ in their domestic labours.

The Malays and other people on the coast not only train them to draught, but to the plough, as the Chinese and Cochin-Chinese do their buffaloes. The superior docility of the animal in these countries is no doubt chiefly attributable to the treatment it receives and the patient character of its masters. Mr. Marsden says, "Though apparently of a dull, obstinate, capricious nature, the carbow acquires by habit a surprising docility, and is taught to lift the shafts of the cart with its horns, and place the yoke, which is fixed to those, across its neck; needing no further harness than a breast-band, and a string which is made to pass through the cartilage of the nostrils. They are also, for the service of the Europeans, trained to carry burthens suspended from each side of a pack-saddle, in roads or paths where the use of carriages is impracticable. It is extremely slow, but steady in its work." It does not appear to be of so hardy a constitution as the domesti-

cated buffalo of the South of Italy, for Mr. Marsden informs us that the least extraordinary fatigue, particularly during the heat of the day, is sufficient to put a period to its life, which is at all times precarious. It is subject to an epidemic distemper, for which no remedy has yet been discovered. The natives of Sumatra use neither milk nor butter, but the great part of those articles of food required by the Europeans there is supplied by the carbows, whose milk is richer than what is produced by the cow; though not in the same quantity.

The female carbow goes nine months with calf, and suckles during six, from four teats. When crossing a river it exhibits the singular sight of carrying its young one on its back. Its cry is weak and sharp—very unlike the lowing of oxen.

The carbows of Sumatra are of two sorts—the white and black. Both are employed in labour; but the natives will rarely eat the flesh of the white kind, saying that it is unhealthy and produces blotches all over the body. Mr. Marsden and others have indeed supposed that the whiteness is a disease in the animal itself, as is the case with the albinos or white negroes. We may observe, however, on the authority of Captain Lyon, that there are white buffaloes also in Africa. Black, or a very dark hue, however, is the predominant, and seems almost to be the natural colour of this animal. Of the thousands of buffaloes, says a correspondent, which he observed in Italy, he never saw one of any other hue than coal black.

The carbow is said not to be properly a wild animal of Sumatra, though it abounds in every part of the island. This appears to be confirmed by the name of *carbow gellan* (stray buffaloes), which the natives give to such as are found in the woods. "Most probably," says Mr. Marsden, "they were at first wild, but were afterwards, from their use in labour and food, all caught and domesticated by degrees, or killed in the attempts to take them. When they now collect in the woods, they are said to be stray cattle; as the people of a conquered province, attempting to recover their natural

liberties are styled rebels. They are gregarious and commonly found in numbers together, on which occasions they are much less dangerous to passengers, than when met with singly." Mr. Marsden also notices this animal's antipathy to a red colour.

The Sumatran buffalo has very little hair, except a bunch at the extremity of the tail; its hide appears to be almost naked. The tail does not descend lower than the middle joint of the leg. The horns sometimes, but very rarely, point forward, they are always in the plane of the forehead, resembling in this respect all other buffaloes, and differing from every other kind of cattle. These horns except at the points, are rather square than round; from the quantity of solid substance they contain, they are valuable in manufacture. The buffalo, as we have stated, is also domesticated in the Crimea, where it is extensively employed by the Tartars as a beast of draught, but from the peculiarities of that climate, which is subject to severe cold as well as heat, the animal seems even more difficult to manage than in Italy.

In Africa it is abundant along the Nile, and in other districts, existing in a wild or emancipated state, as well as in a state of domestication. In Abyssinia, more particularly in the forests of Ras el Fil, the buffalo is very common; its skin is chiefly employed in that country for the making of shields, in which considerable art is displayed.

In the middle ages the buffalo was introduced into Spain and Italy, where in course of time the animal became naturalized, and in some districts may be regarded as in a state of nature.

We have already alluded to the Maremma of Italy; in the worst parts of that pestilential tract of country, there the savage buffalo may be seen, roaming at will, under the care of wild keepers, buffalari, whose lives are passed in this dangerous employment.

The following communication, on the habits, manners, and general treatment of this animal as it exists at the present day in Italy, is so interesting that we have great pleasure in presenting it entire to our readers. It is the

result of personal experience, and on that account alone would be valuable, independent of its conveying so full an account as to require nothing to be added to it.

"Buffaloes were introduced from Africa to Europe during the middle ages, and in course of time were thoroughly naturalized and greatly multiplied in Spain and Italy, to which countries of our continent they are still almost confined.

"More than one of the old Italian chroniclers who wrote when the animal was still a rarity, describe it as a wild ox from Pagan lands, and speak with something like horror of its fierce disposition, its tremendous strength, its fatal horns, red eyes, and thick fuliginous body. And indeed, confronted with the quiet milk-white or fawn-coloured steers of Italy, the buffalo is somewhat diabolical both in disposition and appearance. It was soon, however, ascertained that the buffalo was a very valuable animal, that could flourish and increase in the congenial climates of the south without requiring much attention from man. Wherever there were unhealthy marshes unfit for almost every other purpose, or stagnant pools and damp underwoods, there these African herds would thrive in perfection. Unfortunately the wars that produced and followed the fall of the Roman empire, by removing an intelligent and industrious population, left throughout the Italian peninsula vast and numerous tracts of this sort, where, from want of draining, from the exuberance of vegetation, and from that rapidity with which Nature will everywhere make a wilderness and a desolation, when man is withdrawn from the struggle with her, the country became insalubrious, swampy, and wild in the extreme. In these tracts the buffaloes were turned loose, and left to range almost in a state of nature, acknowledging a doubtful allegiance to a few miserable peasants, who contrived to milk the cows and now and then to take away a buffalo calf, in either of which operations their lives were often put in jeopardy by the savage character of the species. In several places they multiplied so rapidly, and so completely enfranchised themselves from the control of man, that it became necessary to hunt them like wild cattle.

"The face of Italy has been wonderfully improved since the middle ages, and there are now many districts, where the buffalo, much tamed in his disposition, is bred, that have long ceased to be pestilential swamps; but still the stations where he most flourishes, and which are best suited to his habits, are such as have been described, and in them he may be said still to be almost in a savage state. Wherever large herds of buffaloes occur, they may be taken as the sure index of *malaria*. In the wild provinces of the Calabrias, where most of the plains and valleys are always partially swamped by the Laino, the Chratis, the Amato, and numerous other rivers and torrents, they are very common; they range, almost the only occupants, over the plains of Pæstum, and the still wilder and more extensive flats of Apulia. The Pontine Marshes offer them a favourite retreat, and in the pestilential Maremme both of Rome and Tuscany, scarcely any other animals, except wild boars, are ever seen. In northern Italy, where there is infinitely less malaria than in the south, they occur in greatest numbers where the causes of that pest exist, and where its effects are often felt, in the inundated rice-grounds of Lombardy, in the marshes formed by the overflowing of the Po, the Tanaro, the Ticino, or of some other rivers or lakes.

"The writer of this communication has had frequent opportunities of observing buffaloes in all the places mentioned, and in many others not necessary to enumerate. Their habits seem to be the same everywhere, and to differ little from what they are in their wild state.

"The chief delight of their lives, during the heat of summer, seems to be to wallow in water or mud. After they have well rolled themselves they will often remain imbedded for hours without moving, leaving little more than their black snouts visible above water. If disturbed in this enjoyment they are very apt to become sulky and dangerous. They must find nourishment in aquatic and other plants not suited to cows, for they will not only exist, but thrive, where half the same number of cows would be half starved. They are subject, how-

ever, to rapid decline and mortality in case of the failure of water and mud to wallow in. During the writer's residence in the country, part of the province of Apulia was visited by a dreadful drought; insufficient supplies of water were brought from great distances, and in many places the farmers were obliged to eke it out by mixing wine (of which they had a plenty at a very low price) with it. With this beverage they contrived to prevent any great mortality among the rest of their cattle, but they were far from being so successful with the buffaloes. The pools and wallowing places of these animals were not merely dried up—they were literally baked like bricks—and without these resources, essential to the animal's existence, not even wine and water could keep them alive. Before the regular autumnal rains came to the succour of that African-like country, great numbers of them had perished. Woods and thickets, or at least plenty of brushwood or reeds, seem to be, if not altogether so essential, greatly conducive to the animal's comfort. In the Maremme and in the plain of Pæstum, they are constantly seen to retire to dense thickets, at certain times of the day, after they have wallowed in the mire. The wild buffaloes of South Africa can scarcely surpass them in the facility with which they force their way through an entangled wood.

“The thickets on the Pæstan plain are chiefly composed of gigantic myrtles, frequently rising ten or twelve feet, and of other evergreens. They are called in the dialect of the country ‘*macchioni*,’ and sometimes the only paths across the desert run through them. Here the traveller is liable to be startled by hearing of a sudden a savage noise, between a snort and a grunt, or to see close to him, the black fierce-looking head of a buffalo, with blood-shot eyes, peeping through or over the thick shrubs, and turning up his nose as if in scorn. The expression is habitual to and very characteristic of the buffalo. He does not carry his head quietly and modestly like the ox, but thrusts it forward, bringing the facial line nearly horizontal with the neck, and carrying his snout upwards like a wild boar. Though the brute can scarcely be supposed to have

such a sentiment as contempt, he certainly exhibits what we look upon as a manifestation of it, turning up his nose at every thing.

"The sudden sight of these powerful and ill-tempered animals in the solitary *macchioni*, is certainly rather startling; but except at particular seasons, or at loud noises, or attempts to scare them away, or the exhibition of some glaring colour, no attack from them is to apprehended, though from the treacherous-like manner in which they skulk close to you, it seems every moment imminent. A German artist, who went to sketch the magnificent remains of the neighbouring temples, incurred considerable risk by pulling out a red bandana pocket-handkerchief, and the writer himself had once a narrow escape in attempting, after the fashion of the *buffalari*, on horseback with a long spear or goad in his hand, to drive some half dozen of them from one place to another. Their charge, in which they bring their muzzles under and close to the ground, and bring their thick horns upwards, has a very formidable appearance.

"Here, and in every other part of Italy where they are bred, buffaloes are much used as beasts of burden. Their prodigious strength renders them available in many emergencies when the oxen of the country, though large and powerful, entirely fail. An Italian officer has favoured us with the following details from his own observations in the States of Parma and Piacenza:—

"During the building of the new theatre at Parma by Maria Louisa (*Buonaparte's* widow), I have seen six, and I believe sometimes eight, buffaloes, transport one by one the immense columns of the façade, which are all of one piece of marble, and of a weight that you may conceive from their size and material. This they did with such ease as surprised every body, while I am convinced from experience that twenty-four of our best oxen would not have been able to move one of the columns. These marble columns were brought as near as Sacca on the river Po, by water, but from Sacca to Parma is a distance of more than twelve miles, and this the buffaloes performed in one stage without stopping.

"As to the passage of the bridge on the Taro, where

I witnessed another extraordinary proof of the strength of these animals, the fact was simply this:—Marshal B——— had been on business at Parma, and was in a great hurry to return to Milan; I was charged by Maria Louisa to attend him as an escort of honour, as far as Piacenza. We set out in horrible weather, and it had rained the whole of the preceding night and day. On arriving at the Taro we found that torrent in a fearful state, nor was it possible to pass it except by the new bridge which was not yet finished. Nobody had yet passed it, and the approaches to it on either side (the bridge being built very high) were not only steep, but composed of deep loose earth, which had not been beaten or secured. It was determined, however, that we should attempt the ascent; but scarcely had we got a third of the way up, when the carriage sunk in the mud to the axles of the wheels, and stuck fast, in spite of the efforts of four excellent post-horses, and two pair of oxen put to, to assist them. After toiling for an hour, the thought came into my head to try buffaloes, of which I saw some on the opposite side of the torrent. Only one pair was brought over to us, and the oxen being removed, these animals were put to, in front of the foremost pair of horses. Although the horses were almost exhausted by the labour they had undergone, and one of them, frightened at the unusual company of the buffaloes, offered resistance rather than assistance, yet this single pair of robust animals, snorting and blowing a little at first, moved the carriage and dragged it upon the bridge. While thus ploughing with the carriage axle-tree deep, they were themselves nearly up to the chest in mud. B—— could scarcely credit the evidence of his senses. When we were about half way over the bridge, the peasants who had gathered round the carriage to lend a hand, or to obtain a present, making a little confusion, and, as usual with them, a great deal of noise, one of the buffaloes took fright and became unmanageable—and thus exposed not only the Marshal, carriage, horses, and postilions, but your humble servant, the escort of honour, to the hazard of being drowned in

the roaring torrent below, for our new bridge had neither parapets nor any kind of protection at its sides. Having caused the peasants to make a retrograde movement, and hold their tongues, we waited the event. The restive buffalo, on finding itself alone with its master or conductor, who then ventured to approach and caress it, immediately became quiet, and, with his companion, dragged the Marshal's carriage safely over the bridge. We had then to pass my own carriage, and this was done with equal ease by the same pair of buffaloes. In campaigns I have served in, how many pieces of artillery we were obliged to abandon, might have been saved by means of buffaloes!

"In the south of Italy, where they are infinitely more numerous than in the provinces to which our friend refers, buffaloes are always used when great strength is required. In many parts of the kingdom of Naples they are quite as common as beasts of draught, as oxen, and much more common than horses. An Englishman looking only at his own country, with roads level as bowling-greens in all directions, and with breeds of horses suited to every variety of work, will hardly understand this—but in the countries of which we speak, the roads, except a few of the principal ones, are very bad, the horses though spirited are undersized, and the carts and waggons in general are preposterously huge and heavy, and of the very worst construction. Mules, that do not draw, but carry their burdens on their backs, are very generally employed—they are also harnessed to "vettura" or stage-coaches, but there is much work which they could not perform.

"In some of the marshy plains of Calabria, in particular, communication would be almost impracticable were it not for the buffalo. There are not only morasses, swamps, and bogs in every direction, but rivers suddenly swollen to torrents in rainy weather, and unprovided with bridges of any sort, frequently occur. Horses, mules, and oxen would inevitably stick fast in such tracts as these; but a pair of good buffaloes, working chest deep in the mud, will, slowly indeed, but surely, drag a

large *carro* with its goods or passengers through them. To pass the rivers the inhabitants harness the buffaloes to high carts, with wheels of prodigious diameter, so that the platform of the vehicle is considerably above the buffaloes' heads. The animals, from their natural habits, take readily to the water, and provided it does not entirely cover them, they will drag the cart to the opposite bank. The writer of these pages has seen feats of this sort that excited his astonishment. In one instance, on crossing a broad, muddy, sluggish stream, the buffaloes suddenly sank entirely below water, which began to ooze into the awkward vehicle,—the driver roared out with all his might, and with a tremendous effort the animals moved the cart forward, and got to shoulder water, or a harder bottom; but even then, little more than their black snouts, through which they blew violently, appeared above the surface of the stream. After allowing them a little breathing time, the driver set up another shout or roar, and struck them with a long goad he held in his hand. At this warning they renewed their efforts, and snorting and blowing, and throwing up the water (in which, and in mud, they were almost buried the whole way), at last reached terra firma, if a quagmire might be so called.

On the great plain of Apulia, their services are almost equally valuable. On the edges of that pastoral desert a great quantity of corn is grown, the marts of which are the towns of Foggia, Manfredonia, and Bazzetta. To reach those places it is generally necessary to cross more or less of the wide plain, where there can scarcely be said to be any road, every muleteer, waggoner, or traveller shaping his course as he chooses across the desolate flat, much in the same manner as the Arabs do in the Syrtis or other deserts. In some parts of this plain there are tracts of loose, deep sand, and in others, pantani, or swamps, which in rainy seasons are deeply covered with water.

Now the mules, so much used, and so excellent in the steep, rocky mountainous parts of the country, do not like either the sand or the swamp, and, to say

nothing of the casualties to which they are exposed, it would take a large string of mules to carry on their backs half the quantity of corn that a pair of buffaloes will draw in a waggon.

“There are few better places for observing the labours and habits of buffaloes than the great town of Foggia, which rises like an island in the Apulian flat. There they are seen to arrive in all directions, slowly toiling over the plain, with their cumbrous waggons behind them, and their drivers walking at their heads. In summer the heats are intolerable, and the shade of a single tree is not to be found,—the plain, in some parts, swarms with gad-flies and other insects, that drive mules, horses, and even the quiet oxen almost mad; in winter the expanse, open on one side to the stormy Adriatic, is frequently swept by tremendous hurricanes, and when it rains it rains almost as it does between the tropics. Yet in all seasons the buffaloes, exempted from some of the evils to which other animals are exposed by the extraordinary strength of their constitution and from others by the thickness and toughness of their skin, will perform their useful labours.

“It is a curious though rather melancholy sight to meet on the plain, yoke after yoke of these dingy, red-eyed animals, whose appearance is always most gloomy and sulky, and whose pace is as measured as that of the camel. As they arrive at the entrances into the town, the cars halt in a long caravan-like line, and the buffaloes are unyoked, and provided with some water and coarse provender. If not immediately liberated by their drivers they throw themselves on the ground in a fury. In places where stagnant water is at hand, it is almost impossible to prevent them from rushing to it; but at Foggia there is nothing of the sort, and indeed water of any kind is at times rather scarce. Those drivers who are careful of their animals, generally contrive, however, to throw a little water over their flanks, or on the ground where they are about to lie down. A bundle of the broad leaves and stalks of the Indian corn well moistened in water, seems to give them peculiar satisfaction when

placed under them. Like the camel, after their day's toil, they, for the most part, pass the night in the open air, requiring no care from man. A stranger, however, should take care not to get involved among them on a dark night, as when disturbed they are not so patient as the good-natured camels under the same circumstances. These animals, indeed, are often known to attack their own driver and the man who feeds them, and dreadful accidents are by no means uncommon in the districts where they are much in use. They are generally described by those most familiar with them, as being stupidly malignant and ferocious, and altogether incapable of that feeling which attaches other animals to kind masters. It is evident, however, that even their enormous strength is often over-taxed; that they are over-worked and cruelly treated. In one instance that fell under the writer's observation, in which the rage of a buffalo proved fatal to a human life, it appeared that the animal could very well draw a distinction between good treatment and bad. This animal was driven to Foggia by a man who had often driven him before without accident—the day was a very bad one, and parts of the plain they crossed were in a sad state from recent rains. The driver, impatient to reach the town, would proceed without allowing the animals sufficient rest. It was seen by other drivers, going the same route, that the heavily-laden cart frequently stuck deep in the mud, and that the man cruelly goaded his yoke of buffaloes to make them drag on. As he at last reached his usual halting place at the edge of the town, he unyoked, when no sooner did one of the buffaloes feel himself at liberty than he rushed at the man, knocked him down with a blow of his head, and then savagely threw himself on his knees upon the prostrate body. There were several spectators close at hand, and among them some bold and experienced buffalo-drivers; but before they could secure the infuriated animal, he had so kneaded the victim of his revenge that the blood gushed from his mouth, nose, and ears, and he was dead.

“At the great fair held at Foggia, at the end of May and beginning of June, immense droves of almost

wild buffaloes, presenting when thus condensed a most formidable appearance, are brought to the town for sale. They are collected in the *tenute*, or cattle-farms, or in the wildernesses where they have hitherto roamed, and driven to the fair by *buffalari*, all well-mounted, and furnished each with a long goad, not unlike a Cossack's spear. These men, who come from various parts of the kingdom, are almost as wild-looking as the cattle they conduct. They are excellent horsemen, very expert in the use of their goad or lance, and long *couteau de chasse*, which (generally accompanied by a large pistol) they always carry upon their persons. Indeed they not only look a warlike band, but might prove such, and be employed as excellent light troops without any addition to their ordinary equipment. The mass of the Cossacks in the last war were neither so well armed nor so well mounted as these cattle-drivers.

"During the fair of Foggia, the buffaloes are enclosed in a large square, in which, from their great numbers, they are often much crowded. Every buffalo, and at every season, smells more or less of musk; but from the heat, crowd, and their multitudes here, this part of the fair is more strongly perfumed with musk than ever was a London drawing-room, even when that noxious odour was most in fashion. To enter into this almost 'solid square' of ferocious animals, as it is necessary for purchasers to do, seems rather a nervous task to a stranger. The *buffalari* make way with their spears, and shout and whistle to their respective herds in a peculiar manner. Accidents, however, are not uncommon. Sometimes a buffalo, becoming furious, breaks away from the square, runs madly through the town, and as the streets are crowded at that season, he is almost sure to do some mischief. The cry of '*Buffalo scappato*' is indeed a cry of terror. On level ground the speed of the animal is very considerable, but he labours under a disadvantage in descending a hill, as his fore legs are shorter than his hind legs. He also runs with blind fury, straight forward, and may be turned and dodged with success. Still, however, everybody in Apulia and the other places where these animals abound, allow that they are

very much to be dreaded when in a state of irritation. They follow their victim with great pertinacity, and if they reach him they throw him down, kneel on him, and, it is said, never leave the body until they hear that respiration has ceased. From the manner in which their horns are turned back, they can rarely make any use of their points.

"Two friends of the writer, an English gentleman and an Italian, whilst traversing on foot a lonely part of the Campagna of Rome, were suddenly set upon by some buffaloes, and narrowly escaped by creeping under the low arch of a bridge that crossed a ditch, in which uncomfortable place they were obliged to remain a considerable time, until the brutes chose to depart."



189.—La Botta.

The buffalo, as well as the bull, is baited in the amphitheatres of Italy. One kind of sport with the buffalo is called *La Botta*. (Fig. 189.) A large tube made of wicker-work or other flexible materials, well wadded without and within, and open at both ends, looking in short like a cask or butt (whence its name) with the ends stove in, is rolled across the arena. Presently a man creeps into this botta, and then lifting

it up on end, rises on his feet and begins to move, with his head peeping above the cask, towards the buffalo, who at first stares bewildered at the sight, and then runs and upsets the novel object. In this game the man must be careful, when the charge is made, to draw in his head and legs, and keep himself entirely covered like a tortoise in his shell. The buffalo, seeing that the botta no longer moves, kicks it, butts at it for a while, causing it to roll along, and then leaves it: but presently the cask is again raised on end, and moved by the man towards the beast. This trick could not be played with the Toro Vaccino, whose sharp and strong horns, better placed for attack than the buffalo's, would pierce the cask through and through.

The attack of the buffalo in the arena is more dangerous than that of the bull, and in his rage, when he has missed his tormentor, he often strikes the wall furiously with his head and horns, making fragments of stone fly in all directions, apparently without suffering any injury from the violence of the shocks.

THE CAPE BUFFALO (*Bos Caffer*.)

This ferocious animal is a native of southern Africa, associating generally in troops, frequenting the watered glens and ravines among the hills. Like the common buffalo it is fond of wallowing in pools or swamps, where it sometimes passes the greater part of the day. Its temper is depicted in its lowering eye, and the malevolent expression of the countenance, to which the position of the horns overshadowing its fiery eyes not a little contributes. These weapons form at their base a solid rugged mass, covering the forehead, from which they bend downwards, and somewhat outwards, gradually diminishing to the points, which suddenly curve upwards. The distance between the points of the horns is frequently five feet, but the rugose massive base of each is in contact, forming an impenetrable helmet; their colour is black. The ears are a foot in length, pendent, and in a great measure defended by the horns; yet it is ob-



190.—Cape Buffalo.

served that they are always torn and jagged, either from the wounds received in their combats with each other, or from the laceration of thorns and spines, the animals continually forcing their way through the dense thickets. Though not taller than an ordinary ox, the Cape Buffalo is a far stouter, heavier, and more powerful beast; its limbs are short and thick, its body bulky, and its head ponderous. The hide is thick and tough, and sparingly covered with harsh blackish hairs, those on the under-lip and about the corners of the mouth being elongated so as to form a scanty beard. (Figs. 190 and 191.)

Considering the massive proportions of this fierce tenant of the wilds of southern Africa, it possesses no inconsiderable share of fleetness, and when pursued by the hunter it tears through the thicket and up the mountain-side with surprising impetuosity. Not unfrequently, however, it returns to the attack, so that it

is not to be encountered without the utmost caution and the means of escape at hand. Many are the fatal accidents and the narrow escapes from death recorded by the various travellers who have penetrated the country of the Cape buffalo.

The following account of an attack by Sparmann and his party on one of these animals, shows how difficult it is to kill the Cape buffalo; and how dangerous it is to advance when the animal falls on receiving the first discharge. It was on the borders of the Great Fish River that Sparmann on one occasion fell in with several buffaloes, "upon which," says the writer, "we advanced till within twenty or thirty paces of the beast; when, perhaps in some degree actuated by our fears, we discharged our pieces pretty nearly at the same time, while the buffalo, which was behind a thin scrambling bush, upon rather lower ground than we were, seemed to turn his head round in order to make towards us; in the mean while, however, the moment we had discharged our guns we had the pleasure to see him fall, and directly afterwards run down into the thickest part of the wood. This induced us to hope that the shot had proved mortal: for which reason we had the imprudence to follow him down into the close thickets, where, luckily for us, we could get no farther. We had however, as we afterwards found, only hit the hindmost part of the chine, where the balls, which lay at the distance of three inches from each other, had been shivered to pieces against the bones. In the mean while our temerity, which chiefly proceeded from hurry and ignorance, was considered by the Hottentots as a proof of spirit and intrepidity hardly to be equalled, on which account from that instant they ever after appeared to entertain an infinitely higher opinion of our courage than they had ever done before. Several of our Hottentots now came to us and threw stones down into the dale, though without success, in order to find out by the bellowings of the beast whither he had retired; afterwards, however, he seemed to have plucked up his courage, for he came up at last out of the vale of his own accord to the skirts of the wood,



191.—Cape Buffalo.

and placed himself so as to have a full view of us on the spot where we were resting ourselves somewhat higher up: his intention was in all probability, and in the opinion of our old sportsmen, to revenge himself on us, if we had not happened to see him in time and fired at him directly. What perhaps in some measure put a stop to his boldness was, that we stood upon higher ground than he did: for several veteran sportsmen have

assured me of it as a fact, that they know from experience, that the buffaloes do not willingly venture to ascend any hill or eminence in order to attack any one. The third shot, which afterwards was observed to have entered at the belly, was fatal. This occasioned the buffalo to take himself down again into the vale, dyeing the ground and bushes all the way he went with his blood. Though still hot upon the chase, yet we advanced with the greatest caution, accompanied by two of our Hottentots, through the thin and more pervious part of the wood where the buffalo had taken refuge. He was advancing again in order to attack some of us, when Mr. Immelman, from the place where he was posted, shot him in the lungs. Notwithstanding this he had still strength enough left to make a circuit of a hundred and fifty paces before we heard him fall. During his fall, and before he died, he bellowed in a most stupendous manner, and this death-song of his inspired every one of us with joy on account of the victory we had gained; and so thoroughly steeled is frequently the human heart against the sufferings of the brute creation, that we hastened forwards in order to enjoy the pleasure of seeing the buffalo struggle with the pangs of death. I happened to be foremost amongst them; and I think it impossible for anguish, accompanied by a savage fierceness, to be painted in stronger colours than they were in the countenance of this buffalo. I was within ten steps of him when he perceived me, and bellowing raised himself suddenly again on his legs." This was the last effort of the poor beast; but so terrified was Sparmann at the moment, that his shot missed its huge body, and having thus fired unsuccessfully he precipitately fled. On another occasion Sparmann records the destruction of a buffalo, by one of his Hottentots, who was in the utmost danger of being trampled to death. Exciting, from the risk attending it, the chase of this animal is eagerly followed, insomuch that the buffalo is now only to be met with in the interior of the country: in many parts where a few years since it was very common, not a single individual is to be found, and as the colonization

of Southern Africa continues it will become still more scarce, and have the range of its territory more and more restricted, till, with the elephant and other large beasts, it will only find a precarious shelter in the deepest forest, from which it may even be ultimately extirpated.

The bellowing of the Cape buffalo when wounded, his fury as he tears up the earth with his horns, and his efforts to revenge himself upon his foes before he sinks expiring, are terrific.



122.—Skull of *Bos Caffer*.

It is the general opinion of the natives of South Africa, that though the lion frequently attacks the buffalo, he cannot overcome it by dint of strength, but has recourse to stratagem, lying in ambush near some stream where the beast comes to drink. They say that the lion springs upon its back, drives its tremendous claws into the victim's sides and the nape of the neck, tearing and mangling, till the buffalo falls and dies. At other times they affirm that the lion darts suddenly upon the buffalo, fastens on its chest and neck, lacerating and squeezing

the mouth and nose with its fore-paws, till, half suffocated, and exhausted by vain efforts and loss of blood from deep wounds, it expires. The lion, however, does not always make these attacks with impunity, for his carcass is sometimes found gored and trampled, evidently by buffaloes, the herd having come to the rescue of their companion. An allied species (*Bos Pegasus*, H. Smith) is found in Western Africa.

Fig. 192 represents the skull of the *Bos Caffer*.

Genus BISON.

THE AUROCHS, OR ZUBR

(*Bison Europæus*; *Bos Ursus*, Gmelin).

This noble species exists in the great forest of Bialowicza (pronounced Bealawezba in Poland), in Lithuania, where it is protected by stringent laws. In its proportions the aurochs is robust, and its withers are massive and elevated. The largest males stand about six feet high at the shoulders. The hair is of two sorts: one is soft, woolly, and short, covering the whole trunk and limbs; the other is long and rough, covering the upper part and sides of the head, the neck, and shoulders, where it forms a mane; under the lower jaw and along the throat to the chest it is lengthened into a sort of beard. In old bulls the mane is often a foot in length, and is thickest in November. The eyes are small, but fierce and sparkling when the animal is irritated. The tongue, lips, and palate are blue. The tail, which is short, is furnished with a tuft of stiff hairs at its extremity. (Fig. 193.) An odour, described as between that of musk and violets, is exhaled from the skin, especially from that part of the skin covering the convexity of the forehead; it is stronger in the male than the female, and may be perceived at the distance of a hundred yards from the herd.

The flesh of this animal is highly esteemed, but when roasted is said to have a bluish tinge.

Thickets near the swampy banks of rivers are the



193.—Aurochs.

favourite resorts of the aurochs; but in summer and during the warmer portion of autumn, according to Dr. Weissenborn, the herds select sandy spots: in winter they keep quiet by day in the thickest part of the fir-wood, only browsing at night, and finding sustenance in the bark of young trees: in spring they visit spots where the herbaceous plants they relish begin to sprout. They are fond of tree-lichens. The voice of the aurochs is a deep short grunt, which may be heard at a considerable distance.

"The strength," says Dr. Weissenborn, "of the zubr is enormous, and trees of five or six inches in diameter cannot withstand the thrusts of old bulls. It is neither afraid of the wolf nor bear, and assails its enemies both with its horns and hoofs. An old zubr is a match for four wolves; packs of the latter animal, however, sometimes hunt down even old bulls when alone, but a herd of zubrs has nothing to fear from any rapacious animal.

"Notwithstanding the great bulk of its body, the zubr can run very swiftly. In galloping, its hoofs are raised above its head, which it carries very low. The animal has, however, but little bottom, and seldom runs farther than one or two English miles. It swims with great agility, and is very fond of bathing.

"The zubr is generally exceedingly shy, and avoids the approach of man. They can only be approached from the leeward, as their smell is extremely acute. But when accidentally and suddenly fallen in with, they will passionately assail the intruder. In such fits of passion the animal thrusts out its tongue repeatedly, lashes its sides with its tail, and the reddened and sparkling eyes project from their sockets, and roll furiously. Such is their innate wildness, that none of them have ever been completely tamed. When taken young they become, it is true, accustomed to their keepers, but the approach of other persons renders them furious, and even their keepers must be careful always to wear the same sort of dress when going near them. Their great antipathy to the *Bos taurus*, which they either avoid or kill, would render their domestication, if it were practicable, but little desirable. The experiments made with a view of obtaining a mixed breed from the zubr and *Bos taurus* have all failed, and are now strictly prohibited."

Dr. Weissenborn adds—"I shall now conclude my description of the *Bosurus* with adverting to the peculiar circumstances under which that animal is now living in the forest of Bialowieza, which may be considered as the only primitive forest in Europe. This woodland district is level upon the whole, and swampy. It is

intersected by numerous rivulets, and a considerable river, the Narew; these have their origin in many morasses, some of which have not yet been thoroughly investigated. Its total surface amounts to about 352 English geographical square miles, of which about 60 are rushy swamps; the remainder is overgrown with Scotch and red firs, in the proportion of four-fifths; and with numerous species of deciduous trees in that of one-fifth. A list of these may be found in Baron de Brincken's '*Mémoire descriptif sur la Forêt impériale de Bialowicza, &c.*' Varsovie, 1826. In this forest, where the elk is also still met with, there were, according to the census of 1828 given by Mr. Eichwald, 696 head of zubrs, and thirty or forty besides in a neighbouring wood of comparatively small extent. Mr. Jarocki, who gives the number of them after the census of 1829, states the sum total of the adult individuals to have been at that time 663, and 48 calves besides. Whether the number has subsequently considerably decreased, as supposed by Dr. H. O. Lenz ('*Gemeinnützige Naturgeschichte*,' p. 419), in consequence of the Polish revolution, is to me very doubtful, as I have been assured by a Polish gentleman that the forest of Bialowicza had not, in any appreciable degree, been disturbed during that period.

"In this forest the zubr lives, under the protection of strict but no longer inhuman game-laws, as much as possible in its primitive state of locality and liberty. Yet are they so far affected by the cultivation which circumscribes them, that without the assistance of man they could not well get through the winter. During that season they receive supplies of hay at certain places, where the stacks must be well secured, otherwise the zubrs break into them, and spoil much more than they consume, by thrusting their heads deeply into the mass of hay, in order to get at the most fragrant part of it.

"All noisy occupations are strictly prohibited in those parts of the forest where the zubrs live, and when wolves are hunted it is done with great caution and but few dogs.

* * * * *



194.



195.



196.

"In our days, when one or more zubrs are to be killed, which can be legally done only by the especial permission of the Emperor of Russia, the wood is beaten up as for other game, but the drivers, who are furnished with sticks, beat against the trees, shouting 'Uhaha.' The marksmen must be posted to the leeward of the zubrs, otherwise the latter will infallibly force their way through the line of drivers.



197.

"From the time of Augustus III. down to the year 1836, the forest of Bialowicza had not been the scene of a solemn zubr-chase. On the 12th of October, 1836, however, one was held, with a view of furnishing some of the museums in Prussia with specimens; and Prince Dolgorukow, the governor-general of the province of Bialystock, who presided at it, caused it to be conducted with more than usual solemnity. Two thousand drivers

and marksmen were assembled, besides an immense number of spectators whom curiosity had drawn to the spot, where a balcony of fir-branches had been erected for the prince and his suite. Thither different herds of zubrs were driven to be fired at, and the flesh of the largest bull was dressed, to give additional interest to the concluding act of the party—a plentiful dinner."

Figs. 194 and 195 represent the skull, in front and profile, of a young aurochs; Figs. 196 and 197, of an old male.

THE AMERICAN BISON

(*Bison Americanus*; *Bos Americanus*).

The American Bison, formerly spread more extensively than at present, still exists in vast numbers in Louisiana, roaming in countless herds over the prairies that are watered by the Arkansas, Platte, Missouri, and upper branches of the Saskatchewan and Peace rivers. Like its congener the aurochs, the American bison is of powerful frame, and exceeds in bulk the ordinary race of cattle, its height at the fore-quarters being upwards of six feet, and its weight from twelve to fifteen hundredweight, and sometimes much more. The head is huge, ponderous, and carried low; the withers are massive and elevated; the eyes are small and their expression is ferocious; the horns are small and black. The neck, withers, and chest are covered with a profusion of long shaggy hair, contributing to render the appearance of the animal wild and terrific; the hinder quarters are clothed with shorter wool. The general colour is umber brown, acquiring a rusty tint in winter. (Figs. 198 and 199.) Endowed with the sense of smell in great perfection, wary and fierce, the bison associates in large herds conducted by one or two old bulls, whose motions the rest appear to follow; but herds of bulls also live separately. Their food consists of grass and rank herbage, to obtain which in winter they scrape away the snow with their feet. On the approach of an enemy the herd immediately takes to flight; but if one



198.—American Bisons.

be wounded, the life of the hunter is placed in great jeopardy, for, turning in a moment, it rushes on its assailant with headlong impetuosity and with determined resolution. (Fig. 200.) Several fatal instances might be cited in which the hunter has perished from want of caution in attacking this formidable beast, and many hairbreadth escapes are on record.

In defending itself from a dog the bison strikes violently with its fore-feet, and easily keeps its annoying foe at bay.

The flesh of this animal is accounted excellent, the tongue and hump, or flesh on the top of the withers, being especial delicacies. The chase of the bison is

more assiduously carried on, both by the natives and the Europeans.

The bison swims well, and during the heats of summer vast herds make their way to shady rivulets, streams, and pools, in which they delight to plunge and bathe. Herds of twenty thousand, crossing rivers upwards of a mile in breadth, have been seen, as Lewis and Clarke inform us, or darkening the plains on their passage to fresh feeding-grounds.

Salt-springs, or saline morasses, or salt-licks, are great attractions to this animal, and at all seasons are visited by numerous herds. These, however, are incessantly thinned by the hunters, and the time is probably not far distant when the American bison will be as rare and as limited in its extent of range as the aurochs of Lithuania.

At certain seasons of the year the bulls engage in terrible conflicts, and rush furiously upon man, or any other animal which ventures near them. With the exception of man, the most formidable enemy against



199.—American Bison.



200.—American Bison.

which the bison has to contend is the huge grizzly bear, and before this dreaded monster the strongest bull goes down.

It appears that the bison will breed with the ordinary race of domestic cattle, against which the aurochs displays the greatest antipathy, though in one respect the latter approaches nearer to the common ox than does the bison; we allude to the number of ribs, which are thirteen in the ox on each side, fourteen in the aurochs, and fifteen in the bison.

Figs. 201 and 202 represent the skull, front view and in profile, of a young female bison; Figs. 203 and 204, of an old male bison.



201.



202.



203.



204.

Genus OVIBOS.

THE MUSK-OX (*Ovibos moschatus*).

The characters of the genus *Ovibos*, as exhibited by only known species, are as follows:—The horns are rounded at their base, forming a helmet-like mass, covering the forehead, where their edges are in contact with each other; from this mass they emerge round and rising, first bending down between the eye and ear, and then sweeping suddenly upwards. The ears and tail are short; the eyes moderate; the nostrils oblong, and inclined to each other from above downwards; there is no true naked muzzle, but a very narrow naked line surrounds each nostril, the rest being covered with hair; there is no furrow in the upper lip. (Fig. 205.)

The musk-ox is a native of the high latitudes of North America, from the sixty-first to the seventy-fifth degree of latitude. In size it scarcely equals the smallest of the Highland breed of cattle, but appears larger than it really is from the profusion of long matted woolly hair with which it is covered, and which hangs on each side almost to the ground, almost concealing the limbs to the pasterns; the tail is entirely hidden. Beneath the lower jaw, throat, and chest the hair flows full, long, and mane-like. The general colour is dull, grizzled umber brown, darker on the sides and under surface; on the centre of the back is a brownish white mark or saddle.

The districts inhabited by the musk-ox, says Dr. Richardson, are the proper lands of the Esquimaux, and their name for it is Oomingmak. It frequents wild and rocky situations, mostly destitute of wood, feeding on grass during one season of the year, and on lichens during the other. When fat its flesh is tolerable, but at certain times both that of the bulls and cows smells strongly of musk. Though the limbs of the musk-ox are short, they are very vigorous, and the animal is fleet and active. Dr. Richardson mentions one pursued on the banks of the Coppermine, which scaled a lofty sand-

cliff so steep that the party were obliged to crawl up it on their hands and knees.

The parts of the polar regions inhabited by the musk-ox are thus described in the Appendix to Parry's Second Voyage:—

"This species of ox inhabits the North Georgia islands in the summer months. They arrived in Wake Island in the middle of May, crossing the ice to the southward, and quitted it on their return towards the end of September. The musk-ox may be further stated, on Esquimaux information, to inhabit the country on the west of Davis Strait, and on the north of Baffin.



205 — Musk Ox.

fin's Bay ; as a head and horns answering of a bull, being shown to the Esquimaux on the west coast of Davis Strait, who were communicated with on the 7th of September, were immediately recognised, and the animal called by the name of Umingmack. This is evidently the same with the Uminak of the Esquimaux of Volstenholme Sound, who were visited by the former expedition, and of which nothing more could be learnt the time from their description than that it was a large horned animal inhabiting the land, and certainly not a rein-deer. It is probable that the individuals, which extend their summer migration to the north-east of Baffin's Bay, retire during the winter to the continent of America, or to its neighbourhood, as the species is unknown in South Greenland."

It would appear from this, that, as is the case to a greater or less degree with all the animals peculiar to the arctic regions of America, its habits are migratory. On the above statement Dr. Richardson remarks, "The appearance of musk-oxen on Melville Island, in the month of May, as ascertained on Captain Parry's First Voyage, is interesting, not merely as a part of their natural history, but as giving us reason to infer that a chain of islands lies between Melville Island and Cape Lyon, or that Wollaston and Banks Lands form one large island, over which the migrations of the animals must have been performed."

Captain Franklin, in his Journey to the Polar Sea, has given the following account of the habits of this species :—

"The musk-oxen, like the buffalo, herd together in bands, and generally frequent barren grounds during the summer months, keeping near the rivers, but retire to the woods in winter. They seem to be less watchful than most other wild animals, and when grazing are not difficult to approach, provided the hunters go against the wind. When two or three men get so near a herd as to fire at them from different points, these animals, instead of separating or running away, huddle closer together, and several are generally killed ; but if the

wound is not likely they become enraged, and dart in the most furious manner at the hunters, who must be very dexterous to evade them. They can defend themselves by their powerful horns against wolves and musk-oxen, which, as the Indians say, they not unfrequently kill. The musk-oxen feed on the same substances with rein-deer, and the prints of the feet of these two animals are so much alike, that it requires the eye of an experienced hunter to distinguish them. The largest killed by us did not exceed in weight three hundred pounds. The flesh has a musky disagreeable flavour, particularly when the animal is lean, which unfortunately for us was the case with all that we now killed.

The wool of this animal is fine, and some stockings which were made from it in France are said to have been equal to those made from silk. If it could be obtained in sufficient quantity, it might doubtless be employed advantageously as an article for manufacture.

THE END.

