...TCHES IN NATURAL HISTORY.

HISTORY

OF

THE MAMMALIA.

Vol. IV.

ORDERS—RODENTIA; EDENTATA.

WITH NUMEROUS ILLUSTRATIONS.

IN SIX VOLUMES.

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SKETCH

OF THE

HISTORY OF THE MAMMALIA.

Order—RODENTIA.

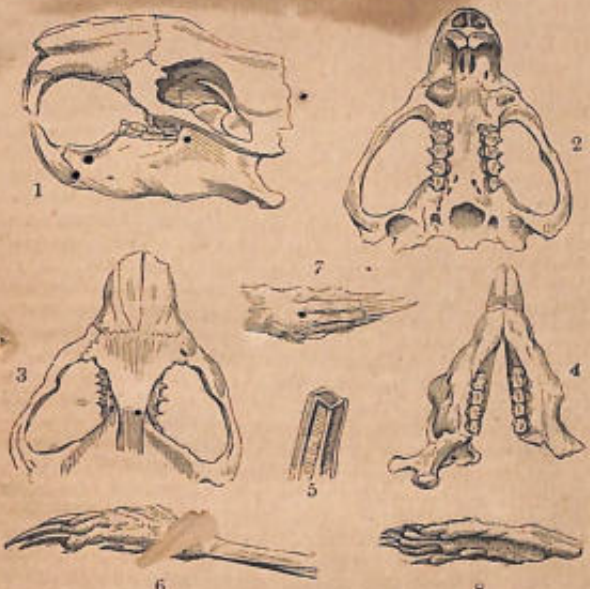
The difficulty of instituting a natural arrangement (that is, an arrangement exhibiting the multiform links and affinities of different groups) is confessedly great; but peculiarly so as it respects the component parts of the present order. In itself, indeed, this order is definite, and based upon characters which form a clear line of separation between it and every other; but when we come to investigate the species it embraces, we soon feel ourselves perplexed among a multitude of forms, and begin to hesitate at every step. Hence it is that no two naturalists have arranged the Rodentia in the same manner; nay, Cuvier himself, in the last edition of his 'Règne Animal,' set aside the principles by which in his earlier edition he was guided, and followed out other views.

Among those naturalists who have lately devoted their attention to the Rodentia, Mr. Waterhouse takes a foremost place; and his arrangement, founded on the truest philosophical principles, is a decided step in the advancement of this department of Zoology. It would be out of place, in a work like the present, to follow this naturalist through his train of researches, but we may give an outline of their results. Mr. Waterhouse considers

that the Rodents resolve themselves into three great primary sections: first, the Murine section; secondly, the Hystricine section; and thirdly, the Leporine section.

Each of these sections embraces several families, each of the latter comprehending several genera. The principal genera contained in the *Murine* section are—*Sciurus*, *Arctomys*, *Spermophilus*, *Tamias*, *Myoxus*, *Dipus*, *Mus*, *Arvicola*, *Geomys*, and *Castor*. The principal genera contained in the *Hystricine* section are—*Bathurgus*, *Oryc-terus*, *Poephagomys*, *Octodon*, *Abrocoma*, *Myopotamus*, *Capromys*, *Echimys*, *Aulacodus*, *Histrix*, *Dasyprocta*, *Chinchilla*, *Cavia*, and *Hydrochærus*. The *Leporine* section contains the genera *Lepus* and *Lagomys*.

Respecting a few genera, as *Ctenodactylus*, *Helamys*, *Otomys* (Smith, not F. Cuvier), *Akodon*, and *Heteromys*, Mr. Waterhouse has not been able to satisfy himself as to their precise systematic classification; and with respect to the genus *Aplodontia* (Fig. 1, skull and teeth), though he places it in the squirrel family (*Sciuridæ*), yet it differs, as he admits, in the absence of a post-orbital process to the skull, and in the molar teeth being rootless. We may here remark that the genus *Aplodontia* contains a Rodent, called by Lewis and Clark the Sewellel (*A. leporina*), and which inhabits the neighbourhood of the Columbia river (N. America), where it lives in burrows, and associates in small companies. The head is large, the nose is thick and obtuse, covered with a dense coat of short fur; eye very small; ear resembling the human in form. Body short, thick, and rabbit-like. Legs very short, and covered down to the wrists and heels with fur similar to that on the body: a little above the wrist-joint, on the inner side, is a small tuft of stiff white hairs. Fur like that of a rabbit out of season, amber and chestnut-brown above, grayish or clove-brown beneath; lips whitish; a rather large spot of pure white on the throat; some white hairs dispersed through the fur. Tail slender, cylindrical, hardly half an inch long. The figure (1) represents the skull, teeth, and paws: 1, anterior half of skull with lower jaw, profile; 2, anterior half of skull seen from below; 3, the same



1.—Skull, Teeth, and Paws of Aplodontia.

seen from above; 4, lower jaw with right condyle broken, seen from above; 5, upper molar tooth; 6, 7, fore foot, upper surface; 8, sole of hind foot.

The Rodentia, as the name implies, have the teeth constructed for gnawing, paring, or scraping down the substances on which they feed. The teeth are only of two kinds, incisors and molars. There are no canines; and between the incisors, which project from the very apex of the jaws, and the molars, which are situated far back, there intervenes an unfilled space of considerable extent. The incisors are universally two in number in

each jaw (if we except the hares and rabbits, in which two minute incisors rise at the back of the large permanent ones): these are strong, compressed, and somewhat curved, with sharp chisel-shaped edges. It is only their anterior surface that is covered with a thick layer of enamel, and this layer forms the cutting edge, as does the layer of steel on softer metal composing a common chisel. Their insertion into their sockets is very deep, but the inserted part is not a true root: these incisors spring from a pulpy germ at their base, from which they are perpetually growing, and this growth bears a due proportion to the rapidity with which their cutting edges wear away by use. So imperative is this law, that, where one incisor is lost by accident, its opposite, having no countercheck, keeps increasing, till it acquires an enormous development, to the annoyance, and often the destruction, of the sufferer. With regard to the molars it may be observed that they differ in number in different species: they are, however, generally characterised by a flat surface; traversed transversely by ridges of enamel, their structure being composed of perpendicular folds of this substance, compacted together by intervening osseous matter; but further than this, we find in different species a structural distinction of physiological importance: in some, as the *Arvicolidæ*, they resemble the incisors, having no true solid roots, but are perpetually growing as their surface wears away; in others, on the contrary (as the squirrels), at a certain period they gain truly formed roots, and after this cease all further growth. In the Rodentia the upper lip, which is cleft longitudinally, is in many species an organ of prehension; or at least is of great importance in gradually transmitting the food into the mouth, as may be seen when we offer the rabbit a leaf or a stalk of clover or dandelion. The pharynx, or back of the mouth, is contracted, and in some species funnel-shaped, and capable of being closed by a circular muscle, in order that the food may pass gradually, as it becomes duly ground to pulp between the molars. The structural organisation of the Rodents, as evidenced by the characters of the skull, the bird-like

condition of the brain, and by other points, is at a low par, and the ratio of their intelligence is in a parallel degree. We may tame them, but we cannot educate them. They are all timid and feeble, and trust for self-protection to flight or concealment. The prey of ferocious beasts and birds and reptiles, their fertility, by a wise provision, counterbalances their annual diminution. Spread over the earth, from the equator to the coldest latitudes, they tenant rocks and mountains, plains and woods, feeding on grain and vegetables, and often devastating the cultivated domains of man. To a vegetable diet some few, as the rat, add animal food also. Most are nocturnal or crepuscular in their habits; many dwell in burrows, some conceal themselves amidst herbage, some amongst the foliage of trees, and some build for themselves habitations which have excited the interest and admiration of man.

In noticing the numerical abundance of the Rodentia, throughout the different quarters of the globe, it should be observed that in Australia six or eight species are all that we are acquainted with belonging to that region; Europe, North America, and South America are nearly equal as to the number of species they contain. India and Africa are also nearly equal, but they contain fewer species than either of the other provinces. The squirrels, rats, porcupines, and hares are the only groups found in all the provinces; all the rest of the groups are respectively confined to their own particular geographical province. The naturalist will find some important observations on the Rodentia by Mr. Waterhouse, in the 'Zool. Proceeds.,' for 1839; in the 4 Zool. of the Voyage of H.M.S. Beagle;' and in the 'Mag. of Nat. Hist,' New Series, 1839, p. 90.

THE SQUIRRELS (Family *Sciuridæ*).

These elegant animals are found in every quarter of the world, Australia excepted. The general characters of the true squirrels (*Sciurus*), as exhibited by our well-known British species, are familiar to all: its fine full

eyes, its light contour, its activity, its deep soft fur, and long bushy tail, have contributed to render it a general favourite. They are furnished with proper clavicles, or collar-bones, and possess the use of the fore-arm and paws in a high degree of perfection; the toes are four, with the rudiment of a thumb, on the anterior feet; five on the hind feet; the claws are sharp and hooked. Molars, $\frac{5-5}{4-4}$. Ears often tufted with a pencil of long hairs. In feeding, these animals sit up on the haunches, and hold their food (nuts, &c.) not between the fingers of their joined fore paws, but between the rudimentary thumbs, while they work at it with their teeth.

The Northern Gray and Black Squirrel (*Sciurus leucotis*).

It is to Dr. Bachman, D.D., President of the Lit. and Phil. Soc., Charlestown, S. Carolina, that we are indebted for clearing up the maze of confusion in which the squirrels of America have been involved.

It appears from this author that several black squirrels exist, totally distinct from each other, and that of these some are mere varieties. Of the genuine species he notices the large Louisiana black squirrel (*S. Audubonii*), the black squirrel (*Sciurus niger*, Linn., not Catesby), and the dusky squirrel (*S. nigrescens*). There is a black variety of the fox squirrel (*S. capistratus*), and a black variety of the Northern gray squirrel, the species figured. The gray squirrels are numerous, and perplexing to the naturalist. The Northern gray squirrel has been, for instance, confounded with the Carolina gray squirrel, from which it is distinct. The Northern gray and black squirrel is a very common species, and exceedingly active and sprightly. It is spread through the Northern and Middle states: it is abundant in New York and in the mountainous parts of Pennsylvania, and extends as far north as Hudson's Bay: southwards, it occurs in Virginia, and perhaps still farther south.

Like all the true squirrels, this species is arboreal in its habits, quick, and alert:—it rises with the sun, and continues industriously engaged in search of food during four or five hours in the morning, running over logs, ascending trees and playfully coursing from limb to limb. During the warm weather of spring it prepares its cradle or nest on the branch of a tree, constructing it of dried sticks which it breaks off, or, if these are not at hand, of green twigs as thick as a finger, which it gnaws from the boughs. These it lays in the fork of a tree or of some large branch so as to make a framework: it then lines this framework with leaves; and over these again spreads a layer of moss. In the preparation of this nest, a pair is usually engaged for an hour in the morning, during several successive days, and the noise they make in cutting the branches and dragging the leaves may be heard a considerable distance. In winter they reside entirely in holes of trees, where their young in most instances are brought forth. The young are from four to six in number; and in a few weeks are sufficiently advanced to leave their nest. It is generally believed that this squirrel lays up a great hoard of food as a winter supply, but Dr. Bachman doubts the fact, though he admits that other northern species do. Further he states that the species which inhabit the southern portion of the United States, where the ground is seldom covered with snow, derive in winter a precarious subsistence from seeds, insects, and worms, which are scratched up among the leaves. We may here observe that, singularly enough, no one has noticed the fact, excepting Mr. C. Coward ('Mag. Nat. Hist.,' New Series, June, 1839, p. 311), of our common British squirrel being carnivorous as well as frugivorous; such is, however, the case: it attacks young birds and greedily devours them, nor is even the wood-pigeon safe from its assaults. The Northern gray squirrel feeds on nuts and various seeds, but it seems to prefer the shell-bark (*Carya alba*) and the several species of hickory to any other food. * Green corn and young wheat suffer greatly from its depredations, and hence a war of wholesale destruction is everywhere

waged against it. In Pennsylvania an old law existed offering threepence a head for every squirrel destroyed, and in 1749 the enormous sum of 8000*l.* was paid out of the treasury for the destruction of these depredators. The extensive migrations which are undertaken by this species, either from a scarcity of food or from some other inexplicable cause, have often excited not only wonder, but apprehension. They generally take place in autumn, but by no means with regularity. It would appear that in the far north-west multitudes congregate in different districts, forming scattered troops, which all bend their way instinctively in an eastern direction, collecting into larger bodies as they proceed; neither mountains nor rivers stop their progress: onward they come, a devouring army, laying waste the corn and wheat fields of the farmer; and as their numbers are thinned by the gun, others fill up the ranks: few, perhaps none, ever return westwardly; those that escape the carnage take up their abode in the forests of their newly-explored country. The gray squirrel has many enemies; the fox, the lynx, the weasel, hawks, and owls are all eager to seize it: when attacked by the red-tailed hawk, its most formidable foe, it is amusing to see the skill and dexterity exercised by both, in the attack, and in the defence; often, indeed, the squirrel, by dodging and twisting round the branches and large limbs of the tree, foils and wears out his antagonist; when, however, a pair of hawks combine, the squirrel has no chance.

The Malabar Squirrel (*Sciurus maximus*).

Of the Indian squirrels, one of the finest is the Malabar squirrel, measuring fourteen or fifteen inches in the length of the head and body, and somewhat more in that of its full bushy tail. (Fig. 2.) This species is found in Malabar, and also in Ceylon. Like the rest of its tribe, it is eminently arboreal, tenanting the summits of palm-trees, and feeding to a great extent upon the cocoa-nut, to the milk of which it is said to be very partial. We have seen several specimens in captivity. They

2.—Malabar Squirrel.

soon become tame and familiar, but are not to be trusted too far: their bite is very severe. General colour above, rich chocolate, deepening about the shoulders into black; under parts abruptly pale reddish yellow; ears tufted with a long full brush.

The Rocky-Mountain Flying Squirrel

(*Pteromys Alpinus*, or *Pt. Sabinus*, var. *β*, Richardson).

The flying squirrels (*Pteromys*, Geoffr.; *Sciuropterus*, F. Cuv.) agree in the general characters of their dentition with the rest of the family (see Fig. 3 for the teeth of *Tamias*, and Fig. 4 for the teeth of *Sciurus*). The incisors are laterally compressed: the molars, $\frac{5-5}{4-4}$, rarely $\frac{4-4}{4-4}$, are equal in size or nearly so, excepting

the anterior molar of the upper jaw, where they are 5—5, which is smaller than the rest. The series of molars on each side are widely separate and parallel. It is in the possession of a lateral fold of skin, forming, when extended, a parachute, enabling them to take long sweeping leaps, that the flying squirrels are distinguishable from the ordinary group. These expansions are

3.—Teeth of Tamias.

fully clothed with soft fur; and they usually project in a pointed form from each wrist, being there supported by a long slender osseous stylet. In some species, as the one figured, this is either reduced to a mere tubercle or wanting. (Fig. 3.)

The flying squirrels are conspicuous for the rapidity of their evolutions: they ascend the trees with such ve-

locity that the eye can scarcely follow them; and they skim from one tree to another, or precipitate themselves to the ground, with singular agility. In their habits they are nocturnal.

4.—Teeth of Sciurus.

These elegant animals are respectively natives of the northern regions of Europe, the north of Asia, the north of America, and the glowing islands of the Indian Archipelago. The present species is one of the American flying squirrels, and was discovered by Mr. Drummond on the Rocky Mountains, where it lives in dense pine-

5.—Rocky-Mountain Flying Squirrel.

forests, seldom venturing from its retreat except in the night. Dr. Richardson received specimens from the Elk river, and also from the south branch of the Mackenzie. Whether it is a mere variety of the *Pt. Sabrinus* or a distinct species is not clear.

Its general colour is yellowish-brown above. The tail is flat, longer than the body, and blackish-gray. Total length fourteen inches three lines, of which the tail, including the fur, measures six inches three lines.

The Common Ground-Squirrel

(*Tamias striatus*).

Unlike the true squirrels, the ground-squirrels are chiefly terrestrial in their habits, and are furnished with cheek-pouches, in which they carry food to their retreats, forming magazines for winter. They live in burrows, but do not appear to become torpid. Their fur is shorter and closer, and the tail less bushy, than in their arboreal relatives. These animals are chiefly spread through the northern and temperate regions of Europe, Asia, and America. The palm-squirrel of India, and the Barbary squirrel, though associated by some authors with the ground-squirrels, occupy an intermediate situation between the latter and the true arboreal species.

The common ground-squirrel is a native of the north-eastern part of Europe and the north of Asia. It is the Ecureuil Suisse of the French, so called because its striped back has some resemblance to a Swiss doublet. According to Pallas, these striped squirrels dig their burrows in woody places, in small hummocks of earth, or near the roots of trees; but never, like the common squirrels, make their nests in the trunk or branches, although when scared from their holes they climb with facility, and make their way from branch to branch with great speed. A winding passage leads to their nest, and they generally form two or three lateral chambers to store their food in. The striped squirrel in its manners, and from having cheek-pouches, is allied to the hamster and citillus (type of the genus *Spermophilus*), and is

likewise connected with the latter by its convex nose, proper for an animal accustomed to dig. In its whole habit it differs from the squirrels which live in trees, and forms, with other striped squirrels, a division of the genus. It has a longer head than the common squirrel; rounded ears, not tufted; a roundish, hairy tail, which it less frequently turns up; a slender body, and shorter limbs. The fur likewise is very short, and less fine. Yet in its diurnal habits, and in not becoming torpid in winter, it comes near the squirrels: it is difficult to tame.

Parry's Spermophile (*Spermophilus Parryi*).

The genus *Spermophilus* is intermediate between the ground-squirrels and the marmots. Besides possessing cheek-pouches, the Spermophiles are distinguished by the closeness of the ears, the slender form of the body, which is squirrel-like, and the narrowness of the paws. (Fig. 6.)

Two species are natives of eastern Europe, viz. the Souslik of the Volga, and the Zizel or Suzel of Hungary, Poland, &c., which are, perhaps, mere varieties. Many species are American, one of which, Parry's *Spermophile*, is the species figured.

Colour of the body above, a mixture of white thickly spotted on a gray or black ground; face chestnut; under parts rust-brown; tail with a narrow white margin, and black at the extremity. This, according to Dr. Richardson, who first named the species, is the Ground-Squirrel of Herne; the Quebec Marmot of Forster; the Seek-Seek of the Esquimaux; the Thœ-thiay (Rock Badger) of the Chepewyans; and the *Arctomys Alpina* of Parry's 'Second Voyage.'

Dr. Richardson states that it inhabits the Barren Grounds skirting the sea-coast from Churchill in Hudson's Bay round by Melville Peninsula, and the whole northern extremity of the continent to Behring's Straits, where specimens precisely similar were procured by Captain Beechey. It is abundant in the neighbourhood of Fort

6.—Parry's Spermophile.

Enterprise, near the southern verge of the Barren Grounds, in lat. 65°, and is also plentiful on Cape Parry, one of the most northern parts of the continent. It is found generally in stony districts, but seems to delight chiefly in sandy hillocks amongst rocks, where burrows, inhabited by different individuals, may be often observed crowded together. One of the society is generally observed sitting erect on the summit of a hillock whilst the others are feeding in the neighbourhood. Upon the approach of danger he gives the alarm and they instantly hurry to their holes, remaining however chattering

at the entrance until the advance of the enemy obliges them to retire to the bottom. When their retreat is cut off, they become much terrified, and, seeking shelter in the first crevice, they not unfrequently succeed only in hiding the head and fore part of the body, whilst the projecting tail is, as is usual with them under the influence of terror, spread out flat on the rock. Their cry, in this season of distress, strongly resembles the loud alarm of the Hudson's Bay squirrel, and is not very unlike the sound of a watchman's rattle. The Esquimaux name is an attempt to express this sound. Herne states that they are easily tamed, and very cleanly and playful when domesticated. They never come abroad during the winter. Their food appears to be entirely vegetable; their pouches being generally filled, according to the season, with tender shoots of herbaceous plants, berries of the alpine arbutus, and of other trailing shrubs, or the seeds of grasses and leguminous plants. They produce about seven young at a time.

The true marmots (*Arctomys*) are thicker, more robust, and less elegant in figure than the Spermophiles; the head is broad and flat, and the muzzle obtuse; the limbs are short, and there are no cheek-pouches.

The Alpine Marmot (*Arctomys marmota*).

This well-known species is common in the high mountain districts of Europe, where it takes up its abode just below the line of perpetual snow, excavating a deep burrow, to which it has recourse on every appearance of an enemy. In this, which it lines with dried grass, moss, &c., it hybernates during the severity of the season. The burrows of the marmot are always constructed in dry situations, and mostly on declivities exposed to the south or south-east. They are of considerable extent, and are worked out and tenanted by families consisting of from five to fifteen individuals. They begin by a passage which runs for about six feet, and is just capable of admitting the animal's body. From the farther end

7.—Alpine Marmot.

of this gallery two others bifurcate, one of which, according to Desmarest, leads to a sort of chamber in the form of an oven, from three to seven feet in diameter; the other ends abruptly, and serves as a storehouse for dried grasses, &c. According to some, these passages are not always to be met with, and MM. Geoffroy and F. Cuvier assert that the cell is at the end of the first gallery. During the summer months groups of these animals may be seen feeding and sporting on the mountain-side. (Fig. 7.) They never wander to any great distance from their burrows, and have always one or more of their number posted as sentinels, which by a piercing cry give warning of danger. About the

middle of September they betake themselves to their winter dormitories, and close the entrance with earth and the dried grass which they have accumulated: here they sink into a profound repose, from which they do not awaken till the return of April. Though timid and inoffensive, these animals defend themselves resolutely when driven to an extremity, and their powerful incisors inflict severe wounds. They lift their food to their mouths while sitting squirrel-like, and will walk on their hind feet. On retiring for the winter they are at first very fat, and numbers are taken at this season, partly for the sake of their skins, and partly for their flesh, which is eaten by the mountaineers. The young are easily

8.—Alpine Marmot.

tamed, and are often carried about by Savoyards for the purpose of exhibition. The marmot produces from three to five at a birth.

This species is of about the size of a rabbit. Its general colour is yellowish-gray, passing into hoary about the cheeks, and blackish-gray on the top of the head; the tip of the tail is black. (Fig. 8.)

9.—Bobac.

THE BOBAC (*Arctomys bobac*).

This species inhabits the regions of Poland through which flow the Dnieper and its tributary streams, whence it ranges through a great part of Northern Asia. It gives preference to hills of moderate elevation, where it chooses a dry locality in which to construct its burrows. These are carried to a great depth, and are tenanted by families consisting of twenty or even forty individuals.

It accumulates in its retreat a quantity of dried herbage for use, before the severity of the season commences, and for early spring consumption, as well as for the sake of warmth. General colour of the fur grayish-yellow mingled with brown, which latter forms transverse undulations on the upper parts. Under parts rust-brown. Length of head and body sixteen or seventeen inches; of the tail six inches. (Fig. 9.)

The Quebec Marmot (*Arctomys empetra*).

This species is one of the American marmots, and is a native of Canada and the neighbourhood of Hudson's Bay. It is the Quebec Marmot of Pennant and Godman; the Common Marmot of Langsdorff; the Thickwood Badger of the Hudson's Bay residents; the Siffleur of the French Canadians, who apply the same name to the other species of marmot and to the badger; Tarbagan of the Russian residents on Kodiak (?); Weenusk of the Crees; Kath-hillæ-Kooay of the Chepewyans; *Mus Empetra* of Pallas; and *Arctomys Empetra* of Sabine and others.

Dr. Richardson, who gives the above synonyms, states that the Quebec marmot inhabits the woody districts from Canada to lat. 61°, and perhaps still farther north.

10.—Quebec Marmot.

He says that it appears to be a solitary animal, inhabits burrows in the earth, but ascends bushes and trees, probably in search of buds and other vegetable productions on which it feeds. (Fig. 10.) Mr. Drummond killed two, one on some low bushes, and the other on the branch of a tree. According to Mr. Graham it burrows perpendicularly, selecting dry spots, at some distance from the coast, and feeding on the coarse grass which gathers on the river sides. The Indians capture it by pouring water into its holes. Its flesh is considered delicate when the animal is fat, but its fur is valueless.

DORMICE (*Myoxidæ*).

The dormice seem to connect the squirrels, on the one hand, to the murine groups on the other. They are boreal in their habits, and clothed with fine soft fur. The toes are four on each fore foot, with the vestige of a fifth; the hind feet have five toes. The dentition (Fig. 12) is as follows:—Incisors, $\frac{2}{2}$; molars, $\frac{4-4}{4-4}$. Incisors laterally compressed; molars unequal in size, rooted; the series on each side of each jaw widely separated and parallel.

The Common Dormouse (*Myoxus avellanarius*).

This elegant little creature is the Muscardin, Croque Noix, and Rat d'Or of the French; Moscadino of the Italians; Liron of the Spanish; Rothe Wald-maus, Hasel-maus, and Hasel-schläfer of the Germans; Skogsmus of the Swedes; Kassel-muus of the Danes; and Pathew of the ancient British. It has been supposed by some that it was this species which the Romans fattened in their Glirária for the table; but that animal was most probably the loir (*M. Glis*), which is common in the woods of Italy, and which approaches a squirrel in size.

Though common in the southern and midland counties of England, the dormouse is not so abundant in France

12.—Teeth of Dormouse.

as the lerot (*M. nitela*, Fig. 15), yet its distribution is very extensive. It ranges from the south of Europe as far north as Sweden. The favourite resorts of this little animal are dense thickets, low woods and coppices of hazel, bushy dells, and tangled hedgerows. It creeps about the branches with a quick but gliding sort of movement, and with singular facility. It leaps nimbly, and makes its way so quickly through intertangled brushwood, that it cannot be easily captured. (Fig. 13.) The dormouse appears to be in some degree gregarious, or at least to colonize favourite spots, and ten or a dozen of their nests have been seen at no great distance apart in

13.—Common Dormouse.

the shrubs of a thicket. These nests are made of leaves, grass, &c.: they are of a rounded form, about six inches in diameter, with the aperture at the top. It is in these that the young are brought forth and reared. The number of the young is about four: they are born blind: in a few days, however, their eyes are opened; and in a short period they are capable of providing for themselves. Corn, haws, hazel-nuts, and fallen acorns constitute the food of the dormouse. It eats sitting up like a squirrel, holding the food between its paws; and often it hangs suspended by its hinder feet, in which position it feeds as easily as in its ordinary attitude.

Mr. Bell states that the name *Avellanarius* is not well

chosen, and that he never saw any dormouse that could gnaw through the shell of that nut when fully ripe. We ourselves, however, have frequently seen the dormouse open with its teeth the hard shell of a nut, and clear it out with great address. The dormouse hybernates, and hoards up a store of provision in holes, and the crevices about the roots of trees, &c., to which to have recourse in the winter; for its torpidity is not without interruption. A midday gleam of sunshine rouses it up in its snug retreat, and invites it forth, when it takes a little food; on the diminution of the temperature it betakes itself to its dormitory, and, rolling up itself into a ball, sinks into a profound slumber. In this condition it may be handled, or rolled about a table, if not exposed to the influence of warmth, without being roused from its trance. It is not until the spring has fairly set in that

14.—Common Dormouse.

the dormouse regains its full activity, and it is at this period that its magazine is of the greatest service: for, without a store thus providently accumulated, it would, for some time at least, be straightened for food.

The head of this species is proportionably large; the eyes are large, black, and prominent; the ears are broad; the fur soft; the tail long, fringed with hair on each side, and somewhat tufted at the end; the body plump; the limbs short. General colour cinnamon red, passing into pale yellow below. The young are of a mouse-gray. Length of the head and body two inches eight lines; of the tail, two inches six lines. (Fig. 14.)

The Garden Dormouse, or Lerot

(*Myoxus Nitela*).

The greater Dormouse of Shaw. This species is a native of the whole of the temperate portions of conti-

15.—Lerot, or Garden Dormouse.

nental Europe, and indeed it is found as high north as Poland and Prussia. In France it is very common, gardens and orchards being its favourite abode; it makes sad havoc among wall-fruits, attacking peaches, apricots, pears, &c. with great avidity. (Fig. 15.) Its winter store, however, consists of nuts, peas, beans, and the like, which are collected in great abundance, and stowed away in some convenient recess, where eight or ten individuals assemble to pass away the colder season in sleep. The summer nest of the lerot, in which it rears its young, is built in the holes of walls or the chinks of aged trees. The young are four or five in number. The colour of this pretty but annoying creature is reddish gray; beneath, white; a black patch surrounds the eye, and spreads behind the ear. The tail is covered with short black hair, except at the end, which is tufted with white. Length of head and body four inches and a half; of the tail, four inches.

The Cape Graphiure (*Graphiurus Capensis*).

The genus *Graphiurus* is scarcely to be separated from *Myoxus;* it is represented by the Cape Graphiure, a native of South Africa. This species is about the size of the lerot, which it much resembles in the style of its colouring, the general tint above being of a deep brownish gray; the muzzle and sides of the face reddish white; under parts grayish white, with a tinge of red; tail brown, the tip, which is not tufted, reddish white; a band of blackish brown extends from the eyes to the base of the ears. (Fig. 16.)

THE JERBOAS (*Dipus*).

The Jerboas constitute a group of the great murine section of Rodents, and termed by Mr. Waterhouse *Dipodidæ*, of which, he observes, the genera *Dipus*, *Alactaga*, and *Meriones* are examples.

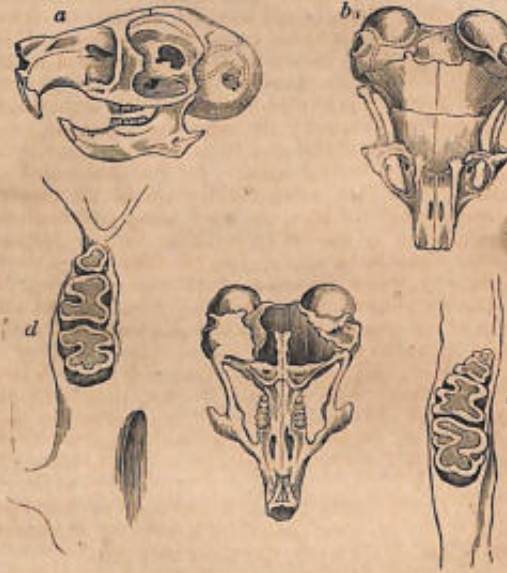
All the animals of this tribe are remarkable for the shortness of the fore-limbs, the development of the hinder limbs, and the length and slenderness of the

16.—Cape Graphiure.

metatarsus; they resemble in these points the kangaroos. They bound along on their hind limbs with great rapidity, and appear almost to skim, like birds, the flat plains or sandy wastes where they take up their abode. In an elaborate memoir by M. F. Cuvier on the Jerboas and Gerbilles, he divides these animals into different genera. The Jerboas (*Dipus*) have only three toes on the hinder feet, and these, as in birds, are articulated to a single elongated metatarsal bone, commonly known as the canon-bone. In the *Alactagas* there are five toes; of these the three central are articulated to a single metatarsal bone, while the other two have each their own slender metatarsal bone.

In *Meriones* and *Gerbillus* the toes are five, each with

their own distinct metatarsal bone. The incisors of the *Alactagas* are simple, whilst those in the upper jaw of the Jerboas are divided longitudinally by a furrow. The molars of the latter genus are complicated in form, and but little resemble those of the former. They are four in number in the upper jaw, and three in the



17.—Skull and Teeth of Dipus hirtipes.

lower; but the first in the upper is a small rudimentary tooth, which probably disappears in aged individuals. After a detailed account of the structure of the grinding teeth, M. Cuvier observes that the general structure of the head of the *Alactagas* and Jerboas is

evidently the same, and is characterized by the large size of the cranium, the shortness of the muzzle, and, above all, by the magnitude of the suborbital foramina. The cranium of the Jerboa is distinguished by its great breadth posteriorly, resulting from the enormous development of the tympanic bone, which extends beyond the occipital posteriorly and laterally, as far as the zygomatic arch, which is by no means the case in the *Alactagas*, where all the osseous parts of the ear are of moderate dimensions. Another differential character between the two genera is presented by the maxillary arch, which circumscribes externally the suborbital foramina, and which in the *Alactagas* may be said to be linear, presenting a very limited surface for the attachment of muscles. He then notes a difference in the relative development of the jaws, the lower being comparatively much shorter in the *Alactagas* than in the Jerboas. Having described a new species of *Alactaga*, a native of Barbary, under the name of *Alactaga arundinis*, M. F. Cuvier proceeds to consider the characters and affinities of the genera *Gerbillus* and *Meriones*, and enters into a critical examination of all the species referred to those genera, and comes to the conclusion that they have a closer affinity with the true *Muridæ*, than with the Jerboas and *Alactagas*. Fig. 17 represents the skull and teeth of *Dipus hirtipes*: *a*, skull, profile; *b*, the same seen from above; *c*, the same seen from below; *d*, *e*, the teeth.

Fig. 18 represents the skull and teeth of *Alactaga*: *a* and *b*, the cranium, one-third larger than the natural size; *c* and *d*, the teeth, five times enlarged.

The Egyptian Jerboa (*Dipus Ægyptius*).

In the true Jerboas the head is large, and not unlike that of a rabbit in form; the ears are long and somewhat pointed; the eyes are full and prominent; the tail is very long, cylindrical, and covered with short hair, except at the extremity, which is tufted. The fur of the body is soft and delicate; the whiskers are long; the fore-feet are very small, and have four toes, and the

18.—Skull and Teeth of Alactaga.

rudiment of a thumb, furnished, however, with a nail. In the hind-feet of these animals we behold palpable evidences of their express adaptation to the deserts where they habitually reside. Not only is the metatarsal portion of the foot extremely elongated, but the toes are clad on the under surface with long bristly hairs, which, while they add to their span, and give firmness and security to their tread on a loose and yielding surface, defend the foot from the heat of a glowing waste beneath a fervid sun.

19.—Egyptian Jerboa.

The Egytian Jerboa is found in Egypt, Barbary, Nubia, and the warmer parts of Syria and Arabia. It lives in troops, which colonize the most arid parts of the desert, where, on hillocks of sand or the crumbled heaps of ruins, they work out long burrows in which to dwell. In these burrows they make their nest and rear their young. So powerful are their teeth, that they not only gnaw in a short time through the hardest wood, but, a Sonnini affirms, through thin layers of stone beneath the sand. According to some, these animals are nocturnal

in their habits, stealing forth to feed and sport when evening begins to close. They are, however, not altogether nocturnal, for Sonnini observed them in broad day playing around the mouths of their subterranean habitations, and he particularly noticed that those which he kept delighted to bask in the sun, and were always lively in that situation. The Jerboas are very timid creatures and hasten to their burrows for security on the least noise: if intercepted, they trust to their speed, and seem to fly across the plain; so great indeed is the rapidity with which they bound along, that a greyhound has some difficulty in the chase. In making each leap they spring from the hind-feet, the impulse being given by the powerful muscles of the thighs, while the tail serves as a balance and rudder. (Fig. 19.) In the act of springing the fore-paws are pressed close to the chest; they descend, however, upon them, but such is the quickness of the leap, and the celerity with which they recover their due posture and spring again, that the eye is completely deceived, for it appears as if they never

20.—Egyptian Jerboa.

used the fore-paws at all, but alike sprang from and alighted on their long slender hind-legs alone. (Fig. 20.) When undisturbed, their common attitude is that of sitting upon the haunches; and the fore-paws are used in the same manner as in the squirrels and marmots. (Fig. 21.) The food of the Jerboa consists principally of bulbous roots which the animals dig up with the fore-paws; they also devour grain and other vegetable matters. It would appear that the Jerboa hybernates, but the duration of its torpor cannot be very protracted.

21.—Egyptian Jerboa.

The flesh of these animals, though unsavoury, is eaten by the Arabs and Egyptians, who contrive to capture them by stopping up all the openings of their subterranean retreat except one, which is netted.

Few animals, if we may judge from our own observations, bear confinement so impatiently as the Jerboas: they sedulously exclude themselves from observation, and when they come forth from their retreat in the evening, they are restless and distrustful in the extreme.

In size this species is equal to a large rat; the general colour is pale tawny yellow, passing into a lighter tint

beneath; the terminal tuft of the tail is black, merging at the tip into white; a white or whitish strip appears on each of the buttocks below the base of the tail.

The Dark-banded Jerboa.

Of this Jerboa, which is figured by Shaw under the name of "the Jerboa," we have never seen an example. It is neither noticed nor figured by Lichtenstein, who has published the best monograph of these animals that has yet appeared. For ourselves we have no doubt but that the original figure was taken from a specimen of the Egyptian Jerboa, in which the abrupt border to the white mark was darker than usual; for in some instances the back is washed with a dusky tint, which has a tendency to assume wavy transverse bands, one of which, on the haunch, as it is said, is occasionally distinct. (Fig. 22.)

With regard to the *Alactagas*, to which we have alluded, the typical species, the Siberian *Alactaga* (*Dipus Jaculus*, Gmel.; the *Alactaga*, Buff.; the Siberian Jerboa, Pennant), is distributed from Arabia, through Persia, Tartary, and Turkey, and as far north as the Volga and Irtish. It inhabits the plains and flat districts, where it makes extensive burrows; in general habits it resembles the common Jerboa of Egypt, but is of larger size.

Its food is stated to consist not only of vegetable but also of animal substances, as small birds and insects; and, as we learn from Pallas, it spares not even its own species. The subterranean habitations of these animals are extremely capacious, and formed about half a yard below the surface of the ground. The passage leading to them is of great length, and pursues a circuitous course, having at intervals additional shafts or openings upwards, affording extra facilities for escape in the event of danger. During the winter they hybernate; retiring to their subterranean chambers, they shut up the openings, and sink into a complete state of lethargy. It is affirmed by Gmelin, that when their burrows are opened at this

25.—Dark-banded Jerboa.

season, a quantity of grain, dried shoots, and herbs are found within them; on the contrary, Pallas affirms that they collect no stores of provision for the winter. It is possible that both these naturalists, who had ample opportunities of investigating the habits of the *Alactaga* in a state of nature, may be correct, and that in the more northern districts of its range it may accumulate a store of provision, for use in the spring, when it first rouses from its torpidity. The *Alactaga* is more numerous and fertile in the warmer than in the colder latitudes; but it is nowhere to be seen in such numbers as the Egyptian Jerboa. From its large size and the superior flavour of its flesh, it is more sought after, as food, than that animal, and is chased, and also taken by stratagem, by the Arabs and Tartars. Such is its swiftness that it appears to skim the plain without touching the ground; even a

mounted horseman on a fleet steed can scarcely overtake it. The fur of the *Alactaga* is extremely soft and fine; on the upper parts it is of a pale fawn-yellow, clouded with grayish brown on the lower part of the back; a white crescentic line extends on each side of the crupper, below the root of the tail. The under parts of the body and inside of the limbs are white; the tail is brown, except the tuft at the extremity, which is black tipped with white.

24.—Teeth of Labrador Jumping Mouse.

The Labrador Jumping Mouse

(*Meriones Labradorius*).

This species appears to be the Labrador Rat of Pennant; the *Gerbillus Hudsonius* of Rafinesque; *Mus Labradorius* of Sabine; *Gerbillus Labradorius* of Harlan; the La-

brador Jumping Mouse of Godman; and Katse (the Leaper) of the Chepewyan Indians.

The genus *Meriones* in dental formula differs in some points from *Dipus*. The upper incisors, of a deep orange-colour, are marked with a longitudinal furrow; the molars are four on each side above, and three below; the first above is very small; the surfaces of the rest in both jaws are marked with irregular winding lines of enamel. (Fig. 24.) The muzzle is narrow and elongated; the ears rounded, the hind-limbs considerably developed; the tail long, ringed with scales, and thinly covered with short hair.

The Labrador Jumping Mouse, which was first described by Pennant in his 'Arctic Zoology,' is very

25.—Labrador Jumping Mouse.

common in the fur countries of North America, as far north as the Great Slave Lake, and perhaps farther; but of its habits we have no precise details. Its general colour is brownish-yellow, merging into white beneath. The length of the head and body is about five inches, that of the tail five and a half. (Fig. 25.) Dr. Richardson remarks respecting the jumping mice, of which there are, it would appear, several species, that those inhabiting different districts in America require to be compared with each other before the true number of species and their geographical distribution can be ascertained.

26.—Teeth of Cape Leaping Hare.

The Cape Leaping Hare

(*Pedetes Capensis*, Ill.; *Helamys Capensis*, F. Cuvier; *Grande Gerboise*, Buffon; Spring Haas of the Dutch Colonists; *Cape Gerboa*, Pennant).

This curious animal, the only known example of the genus *Pedetes*, occupies an indeterminate situation among

the Rodents; but is most probably the most nearly related to the true Jerboas, which it resembles in external appearance. The molars are four on each side, in each jaw, of simple structure, with two laminæ; the incisors are large, strong, and broad. (Fig. 26.) The anterior limbs are short, but very strong, furnished with five toes armed with powerful claws. The hind-limbs are developed and muscular, four-toed, the toes armed with long

27. Cape Leaping Hare.

pointed and somewhat hoof-like claws. Tail long. The leaping hare equals our common hare in size: the fur is soft, and of a dark fawn or brownish-yellow, passing into white beneath; the tail is hairy and tufted at the extremity with a pencil of black. The head is large, the ears are long and pointed, and the eyes full and dark. Native country, South Africa. (Fig. 27.)

The leaping hare is a burrowing animal, making its holes in the soft sandy ground, which it digs up with its fore-paws, spurting it backwards with its hind-feet, as is done by the rabbit. In these burrows it sojourns during the day, secure from the attacks of the various carnivorous animals which infest the precincts of its retreat. Night is the season of activity: it steals forth on the close of daylight to feed; and in some districts where it abounds the depredations which it commits in the fields of grain are very serious. It proceeds in the same manner as does the jerboa, by a series of bounds; and when the animal is pursued, each bound it makes clears a space of twenty or thirty feet. It eats sitting nearly upright, and using its fore-feet in the manner of a squirrel, to bring the food to the mouth. It also sleeps in the same attitude, excepting that the head is bent down between the hind-limbs, while the fore-paws cover the eyes and ears.

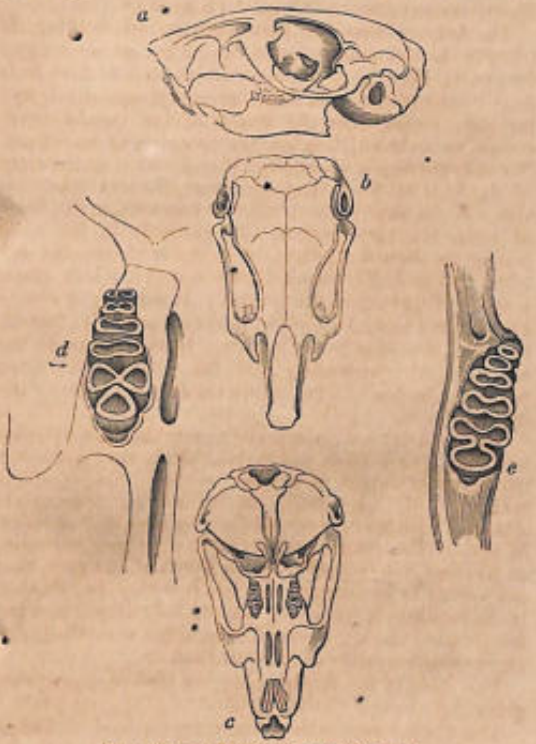
The leaping hare gives preference to the sides of steep and craggy mountains, and in some places they colonize a considerable extent of ground, making it a complete warren. Mr. Burchell, on his second journey to Asbestos Mountain, observed their burrows in abundance. Whether this animal lays up a store of winter provision, or whether it hybernates during a part of the year, does not appear to be ascertained; but it is very certain that, in the localities it frequents, it is not only subject to a low temperature during the cold season, but that it will also experience a scarcity of its usual food.

The voice of the leaping hare is a kind of inarticulate grunt.

The Caffres esteem these creatures for food, and expel them from their burrows by pouring water into the entrances, when they issue forth and are easily taken.

Burton's Gerbille (*Gerbillus Burtoni*).

The *Gerbilles* belong to the family *Muridæ* (and not to that of the true jerboas). The contour of the skull and the characters of the teeth are confessedly murine (see Fig. 28: *a*, the skull, profile; *b*, the same seen



88.—Skull and Teeth of Burton's Gerbille.

from above; *c*, the same seen from below; *d*, *e*, teeth of the same). Though the gerbilles have the posterior limbs developed, their development is by no means to the same extent as in the jerboas; and there is a far more equal proportion between them and the anterior pair; hence these animals run as well as leap. They are active, elegant little creatures, living in burrows, which they excavate to a considerable depth, and are nocturnal in their habits. F. Cuvier enumerates eight species, respectively natives of Egypt, and other parts of Africa, and India. The species figured (Fig. 29) has been recently described by F. Cuvier (see 'Trans. Zool. Soc.' vol. ii.). Of its peculiar habits we know nothing definite, but they in all probability agree with those of the Indian gerbille, so well described by

29.—Burton's Gerbille.

General Hardwicke in the eighth volume of the 'Linn. Trans.' The Indian gerbille is common in Hindustan, and seems to be gregarious, great numbers associating together. "These animals are very abundant about cultivated lands, and are particularly destructive to wheat and barley crops, of which they lay up considerable hoards in spacious burrows near the scenes of their plunder. They cut the culms of the ripening corn just below the ears, and convey them thus entire to one common subterraneous repository, which when filled they carefully close, and do not open for use till supplies abroad become distant and scarce. Grain of all kinds is their favourite food, but in default of this they have recourse to the roots of grass and other vegetables. About the close of day they issue from their burrows, and traverse the plains in all directions to a considerable distance; they run very fast, but oftener leap, making bounds of four or five yards at a time, carrying the tail extended in a horizontal direction. When eating, they sit on their hind-legs like a squirrel, holding the food between their fore-feet. They never appear by day, neither do they commit depredations within-doors. I have observed their manners by night, in moonlight nights, taking my station on a plain, and remaining for some time with as little motion as possible. I was soon surrounded by hundreds at the distance of a few yards, but on rising from my seat the whole disappeared in an instant, nor did they venture forth again for ten minutes after, and then with much caution and circumspection.

"A low tribe of Hindoos called Kunjers, whose occupation is hunting, go in quest of these animals at proper seasons to plunder their hoards of grain; and often within the space of twenty yards find as much corn in the ear as could be crammed into a common bushel. They inhabit dry situations, and are often found at the distance of some miles out of the reach of water to drink. In confinement this animal soon becomes reconciled to its situation, and docile: sleeps much in the day, but when awake feeds freely at night. The Hindoos above mentioned esteem them good and nutritious food."

The Indian Gerbille is of the size of a common rat;

its eyes are full and black; the ears are large, rounded, and almost naked. The general fur is bright bay, variegated on the back with pencil-like strokes of dark brown; the under parts are white; the tail is cylindrical, thickly covered with short hair, except at the tip, which is somewhat tufted, and of a dark brown.

Mitchell's Gerboa.

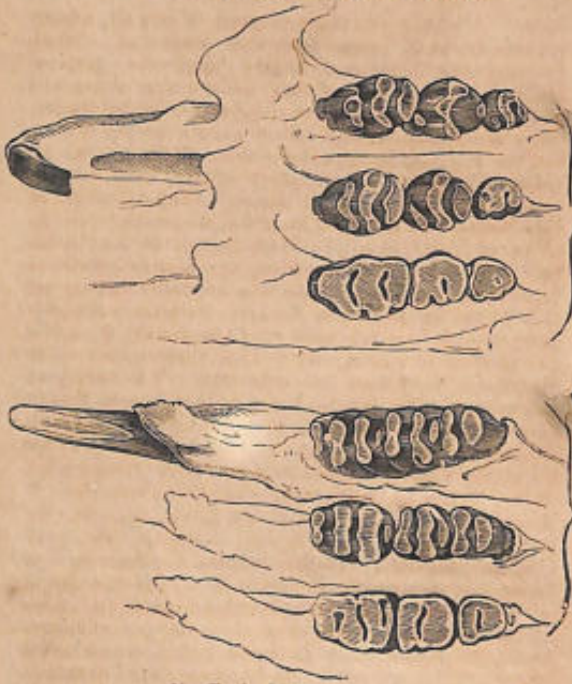
This animal, a native of Australia, and described by Mr. Ogilby under the name of *Dipus Mitchellii* ('Linn.

30.—Mitchell's Gerboa.

Trans.,' vol. xviii.), belongs, as we have every reason to believe, to the genus *Hapalotis* (Lichtenst., 'Säugt.' pt. vi., 1829). It seems to take the place, on the open plains of Australia, of the jerboas and gerbilles of the deserts and plains of Africa and Asia; or of the jumping mice of North America. This singular species was found on the reedy plains near the junction of the Murray and Murrumbidgee, on the northern boundaries of Australia Felix. The cut is taken from the figure in Sir T. Mitchell's account of 'Three Expeditions into the Interior of Eastern Australia.' (Fig. 30.) Sir T. Mitchell states that the fore and hind legs of this animal resembled in proportion those of a kangaroo; and it used the latter by leaping on its hind-quarters in the same manner. It was not much larger than a common field-mouse, but the tail was longer in proportion than even that of a kangaroo, and terminated in a hairy brush about two inches long. We may here remark that the genus *Hapalotis* is the same as *Conilurus*, Ogilby ('Linn. Trans.,' xviii., pt. i., p. 124, 1838), and must be retained, according to the law of priority.

The Common Mouse (*Mus musculus*).

The genus *Mus*, which includes the true rats and mice, is typical of the extensive family *Muridæ*. The characters of this genus may be thus summed up: incisors of the usual number; those of the lower jaw compressed and pointed; molars on each side, both above and below, three, with true roots, and a transversely tuberculated surface, the ridges varying in number in each tooth; the anterior molar is the largest, the posterior the smallest. (Fig. 31.) The muzzle is elongated and sharp; the ears are oblong or rounded, and almost naked. The toes of the anterior feet are four, with the minute rudiment of a thumb; those of the hind-feet are five. The limbs are short; the tail is long, cylindrical, tapering, and annulated with scales of epidermis, from between which emerge short hairs, forming a scanty covering. The fur is soft, [illegible] traversed by long outer hairs of a



31.—Teeth of Common Mouse.

stiffer quality than those composing the under-coat. All these animals are of small size, yet many are among the greatest pests to man. Although vegetable aliment, as grain, peas, &c., forms their principal food, still to a certain extent they are carnivorous. We know the partiality of the mouse to cheese, butter, lard, tallow, &c., and of the brown rat to raw flesh. The stronger and larger species often prey upon the smaller, and in times of scarcity they will attack and devour each

other. All are nocturnal, and most, if not all, subterranean in their habits, and also gregarious. Some frequent the fields and woods, some the gardens, and some the abodes of man, undermining floors and walls, and breeding within the precincts of his habitation. They are spread through every quarter of the globe; and the common mouse and the brown rat have been introduced by the indirect agency of man, even into the remotest and most desolate islands. (See 'Zoology of the Voyage of H.M.S. Beagle—Mammalia,' No. ii. of pt. ii., p. 31, et seq.) With respect to the brown rat (*Mus decumanus*), sometimes erroneously called the Norway rat, it appears to have been originally transported from Persia or India into Europe; its place was previously occupied by the black rat (*Mus rattus*), a smaller and more timid animal, and in some districts now quite extirpated by its more powerful rival. The brown rat was not known in England before 1730, nor in France before 1750. According to Pallas, it did not appear in Russia and Siberia till 1766; and Dr. Harlan states that it did not make its appearance in North America till 1775. When Dr. Richardson wrote his 'Fauna Boreali-Americana,' it was common in Lower Canada, but had not advanced much beyond Kingston in Upper Canada. He did not observe it in the fur countries, and believes, if it exists there, that it is only at the mouth of the Columbia river or at the factories on the shores of Hudson's Bay. Mr. Darwin found it at Buenos Ayres, Valparaiso, East Falkland Island, and Keeling Island. With respect to the black rat, even that is in all probability of foreign origin. It was not known in Western Europe before the middle of the sixteenth century, and Gesner was the first who described and figured it.

In the Island of Ascension, in the Atlantic Ocean, Mr. Darwin found two varieties, as he and Mr. Waterhouse consider, of the black rat (*Mus rattus*). These two animals differ in the colour of the fur, one being of a grizzled brownish colour, the other black, with more soft or glossy fur. "The specimen which has a black and glossy fur frequents the short coarse grass near the

summit of the island, where the common mouse likewise occurs. It is often seen running about by day, and was found in numbers when the island was first colonized by the English a few years since. The other and browner coloured variety lives in the outhouses near the sea-beach, and feeds chiefly on the offal of the turtles slaughtered for the daily food of the inhabitants. If the settlement were destroyed, I feel no doubt that this latter variety would be compelled to migrate from the coast. Did it originally descend from the summit? and, in the case first supposed, would it retreat there? and if so, would its black colour return? It must, however, be observed that the two localities are separated from each other by a space, some miles in width, of bare lava and ashes. Does the summit of Ascension, an island so immensely remote from any continent, and the summit itself surrounded by a broad fringe of desert volcanic soil, possess a small quadruped peculiar to itself? or more probably, has this new species been brought by some ship from some unknown quarter of the world? Or, I am again tempted to ask, as I did in the case of the Galapagos rat, has the common English species been changed by its new habitation into a strongly marked variety?—D." ('Zool. of Voyage of Beagle,' p. 36.)

This zoological problem is one of the many so difficult to solve. Mr. Waterhouse remarks, "It appears as if the brown and black rats (*M. decumanus* and *M. rattus*), and likewise the common mouse, all of which follow man in his peregrinations, and which to a certain degree are dependent upon man, and may therefore be termed semi-domestic animals, are, like really domestic animals, subject to a greater degree of variation than those species which hold themselves aloof from him." (Ibid.)

The common mouse is undoubtedly indigenous in Europe; and has been known from the earliest times: it is the Anglo-Saxon Mus, the German Maus, the Danish Muys, the Latin Mus, and the Greek Μῦς. In Spanish its name is Rat; in Portuguese, Ratinho; in Italian it is called Sorice; and in French, Souris: from the Latin *sorex*, employed by zoologists to designate the Shrews.

This elegant but troublesome little animal needs no description; all are well acquainted with it. (Fig. 32.) "Domestic in its habits," says Mr. Bell, "nourished by almost every article of human food, and finding effectual shelter in the secret recesses of the habitations which human art has raised, it has accompanied man in all his adventures for colonization, and identified itself with every new territorial occupation of our race." The mouse is easily tamed, and it is interesting to observe it

32.—Common Mouse.

sitting up holding its food between its paws, or cleansing with them the sides of its face and the back of its ears, its black eyes glistening with animation. An albino variety (white, with red eyes) is not uncommon (Fig. 33), and often kept in cages for the sake of its beauty. It breeds freely in captivity, perpetuating a white race, which, born and bred in captivity, are gentle and familiar,

33.—Common Mouse.

and when allowed to run about a room never attempt to escape.

The common mouse produces young to the number of five or six, several times during the course of the year. In about a fortnight they leave the mother, and obtain their living independently.

To this species Mr. Waterhouse (see 'Zool. of Beagle') refers six specimens in Mr. Darwin's collection: "Two were found living in the short grass near the summit of the island of Ascension, where the climate is temperate. Two others were procured on a small stony and arid island, near Porto Praya, the capital of St. Jago, in the Cape de Verde Islands, where the climate is very hot and dry. Excepting during the rainy season these little animals can never taste fresh water, nor does the island afford any succulent plant. A specimen was also procured on a grassy cliff on East Falkland island, at the distance of a mile from any habi-

tation. It is singular that so delicate an animal should be able to subsist under the cold and extremely humid climate of the Falkland Islands and on its unproductive soil."—*Darwin.* 'It must be observed that all these specimens are rather less than full grown individuals of the same species procured in England: in other respects they do not differ.

The sixth specimen is from Maldonado, where it is common in the houses of the town, and is similar in habits to its European relative. The Maldonado mouse is considerably less than British specimens of the common mouse, and is of a richer and brighter colour; the head is smaller, the muzzle shorter in proportion, whilst the tarsi are even longer than in a large specimen of *Mus musculus*. These points of dissimilarity induced Mr. Waterhouse to regard it as a distinct species, and to apply to it the name of "*brevirostris*." But upon subsequent re-examination, he was induced to change his opinion. The teeth indicate that it is not an adult specimen.

Mr. Darwin ('Journal and Remarks') observes that mice and other small Rodents subsist in considerable numbers in very desert places, as long as there is the least vegetation. In Patagonia, even on the borders of the Salinas, where a drop of fresh water can never be found, they swarm. Next to lizards, he adds, mice appear to be able to support existence on the smallest and driest portions of the earth, even on the islets in the midst of great oceans. He believes it will be found that several islands, which possess no other warm-blooded quadruped, have small Rodents peculiar to themselves. Sir Woodbine Parish ('Buenos Ayres,' &c.) states, that after the great drought of 1830, 1831, and 1832, there was a prodigious increase of all kinds of vermin, especially field-mice, myriads of which overran the country, and entirely destroyed the maize-harvest of 1833.

The Barbary Mouse (*Mus Barbarus*).

In size this beautiful species is intermediate between the common mouse and rat. It is found in Barbary,

34.—Barbary Mouse.

where the natives term it Phär Azeph, the Palmetto mouse. Some time ago three individuals were living in the vivarium of the Zool. Soc., Lond.; and were described and figured by Mr. Bennett, who may be said to have really introduced this species to science: for, since the time of Linnæus, who first described the animal in the addenda to the twelfth edition (the last published by himself) of his 'Systema Naturæ,' no naturalist appears to have seen it. So completely, indeed, had it escaped the researches of later zoologists, that M. Desmarest ventured to suggest a doubt of its existence. (Fig. 34.)

"The ground-colour of the Barbary mouse is dark brown, marked on each side with five or six yellowish

stripes, about half as broad as the intervening spaces, extending along the whole length of the body, and becoming confused towards the under parts, which are nearly white. On the fore-feet only three of the toes are at first visible, and this circumstance, mentioned in the specific character given by Linnæus, has led many subsequent naturalists to doubt whether the Barbary mouse really belonged to the genus with which it was associated. Linnæus himself had, however, stated in his description of the species, that rudiments of a thumb, and also of a fifth toe, were observable on closer inspection; and this statement has been fully confirmed by an examination of the specimens in the Zool. Gardens" ('Gardens and Menagerie delineated,' p. 31).

Of the native habits and manners of the Barbary mouse we have no definite information. Those in confinement, to which we have alluded, resembled the rat in actions and disposition. Their carnivorous propensities indeed were amply evinced on the death of one of their number by the two survivors having commenced devouring the body.

It may be observed that the specimens examined by Linnæus were very young, for he describes them as being smaller than the common mouse.

A beautiful striped mouse, termed the Cape striped mouse (*Mus pumilio*), is peculiar to the districts of the Cape of Good Hope. It was first described by Sparrman, who gives a figure of it in his 'Travels in Africa,' taken from a young individual. The general colour is brownish-gray, with four black stripes along the back; the upper surface of the head is black. Another species, the Indian striped mouse (*Mus striatus*), of which a few years since little was known, may also be noticed. Specimens of this animal have been kept alive in the vivarium of the Zool. Soc. The general colour is gray with a tinge of reddish or yellow, and the back is marked with a dozen longitudinal rows of small white spots distinct from each other, forming so many interrupted stripes; the under parts are whitish.

Darwin's Mouse (*Mus Darwinii*).

Among the numerous small Rodents belonging to the family *Muridæ* collected by Mr. Darwin (see 'Zool. of H.M.S. Beagle'), is a small group, the species of which, Mr. Waterhouse observes, though very closely allied to the genus *Mus*, offer some slight modification not only in their external form, but also in the structure of the teeth.

"They have the fur soft and silky; the head large; and the fore-legs very small and delicate; the tarsus moderately long, and bare beneath. In the number and proportion of their toes they agree with the true rats; the tail is moderately long and more thickly clothed with hair than in the typical rats. The ears are large and clothed with hair. Like the true rats, they have twelve rooted molars; the folds of enamel, however, penetrate more deeply into the body of each tooth, and enter in such a way that the crowns of the teeth are divided into transverse and somewhat lozenge-shaped lobes of a triangular form. In the front molar of the upper jaw the enamel enters the body of the tooth twice, both in the outer and inner sides; and in the second and posterior molars, both of the upper and under jaws, the enamel penetrates but once externally and internally in each. In the front molar of the lower jaw the enamel enters the body of the tooth three times internally and twice externally" ('Proc. Zool. Soc.,' 1837, p. 27). These murine animals Mr. Waterhouse regards as constituting a subgenus, for which he proposes the name of *Phyllotis*. Darwin's mouse, *Mus* (*Phyllotis*) *Darwinii*, was found in dry and stony places at Coquimbo in Chile. The fur above consists of cinnamon-coloured and blackish hairs intermixed; the space before the eyes is of a grayish tint; the sides of the face and body are of a pale cinnamon colour. The under parts and limbs white; the ears are large; the tail as long as the head and body, brownish above, white beneath. Length of head and body six inches. (Fig. 35.)

Besides the subgenus *Phyllotis*, Mr. Waterhouse cha-

racterizes the following as subgeneric sections of the genus *Mus*, all peculiar to South America, and of which specimens were collected by C. Darwin, Esq., at various localities, viz., Coquimbo, Valparaiso, Port Desire, Maldonado, Bahia Blanca, &c.: *Scapteromys*, *Oxymycterus*, *Abrothrix*, *Calomys*, *Reithrodon*, and *Abrocoma*. ('Proc. Zool. Soc.' 1837.) The two latter, indeed, he considers as valid genera.

35.—Darwin's Mouse.

In North American there are two interesting genera of the *Muridæ*, which may here be noticed, namely, *Neotoma* and *Sigmodon*, both established by Say and Ord in the 'Journal of the Acad. Nat. Soc.,' Philadelphia. To the first genus belongs the Florida rat (*Neotoma Floridana*), larger than the ordinary rat, with soft velvety fur of a lead colour, with yellowish and black hairs intermixed. The specimen described by Say and Ord was discovered in a log granary situated in a ruined and deserted plantation in East Florida.

"When first aroused it ran a short distance, then returned, and stood close by us, allowing us to touch it with a gun before it again retreated. It was mild, or without that suspicious and cunning air so remarkable in the common brown rat. We have reason to think that the species is not uncommon in Florida, as several individuals were seen by Mr. Say, in an old mansion, but he was unprovided with the means of capturing them." Specimens are preserved in the Museum of the Zool. Soc. A second species was discovered by Mr. Drummond in the Rocky Mountains, and is described by Dr. Richardson under the title of *N. Drummondii*. This animal "makes its nest in the crevices of high rocks, and seldom appears in the daytime. Its food most probably consists of herbage of various kinds, and of small branches of pine-trees, because there is generally a considerable store of those substances laid up in the vicinity of its residence. It is very destructive. In the course of a single night the fur-traders who have encamped in a place frequented by these animals have sustained much loss by their packs of furs being gnawed, the blankets cut in pieces, and many small articles carried entirely away. Mr. Drummond placed a stout pair of English shoes on the shelf of a rock, and as he thought in perfect security, but on his return after an absence of a few days he found them gnawed into fragments as fine as saw-dust." This species is nine inches in the length of the head and body, its tail being seven inches and a half. Its general colour is yellowish brown above, and white beneath: the fur is full and soft, and the tail is bushy and densely hairy, instead of being round, tapering, and thinly covered with hair, as in the Florida rat. (Specimen in Museum of Zool. Soc.) With respect to the genus *Sigmodon*, the dentition of which is characterized by the flexures which the folds of enamel on the molar teeth present, one species only is described, viz., the rough-haired *Sigmodon* (*S. hispidum*). This animal is very numerous in the deserted plantations lying on the river St. John in East Florida, particularly in the gardens. Its burrows are seen in every direction.

Emigrants to that section of the country will find the species a great pest in rural economy. General colour, pale dirty ochre mixed with black; under surface ashy gray. Length of head and body, six inches; of the tail, four inches. (Specimen in Museum of Zool. Soc.) Closely allied to the genus *Neotoma* is a species termed the white-footed mouse (*Mus leucopus*), found in California, and on the borders of the Columbia river. The habits of this elegant little creature are well described by Dr. Richardson, who observed it as far north as the Great Bear Lake. "The gait and actions of this little animal are so much like those of the English domestic mouse, that most of the Europeans resident at Hudson's Bay have considered it to be the same species, altogether overlooking the obvious differences of their tails and other peculiarities. This American mouse, however, has a habit of making hoards of grain or little pieces of fat, which I believe is unknown of the European domestic mouse; and what is most singular, these hoards are not formed in the animals' retreats, but generally in a shoe left at the bedside, the pocket of a coat, a nightcap, a bag hung against the wall, or some similar place. It not unfrequently happened that we found barley, which had been brought from a distant apartment, and introduced into a drawer, through so small a chink, that it was impossible for the mouse to gain access to its store. The quantity laid up in a single night, nearly equalling the bulk of a mouse, renders it probable that several individuals unite their efforts to form it. This mouse does considerable mischief in gardens, and in a very few nights will almost destroy a plantation of maize, by tracing the rows for the purpose of collecting the seeds, and depositing them in small heaps under the loose mould, generally by the side of a stone or piece of wood. From the facility with which it seems to transport the substances it preys upon, I suspected that it had cheek-pouches, but none were found on examination. The Ermine is a most inveterate enemy to this species, and pursues it even into the sleeping apartments of houses." The colour above is fine dark brown; the under part

and feet are white. (Specimens in Museum of Zool. Soc.)

THE LONG-TAILED FIELD-MOUSE (*Mus sylvaticus*).

Eyes full, black, and bright;—colour above reddish brown, beneath whitish; ears more than half the length of the head; tail somewhat shorter than the head and body. Length of head and body three inches eight lines. It is Le Mulot of Buffon. (Fig. 36.)

36.—Long-tailed Field Mouse.

This beautiful but mischievous little animal is spread over the whole of temperate Europe. It frequents woods, plantations, parks, orchards, and gardens, where it commits great devastations. In some places it multiplies in hosts, and instances are on record of young plantations covering acres having been totally destroyed

by their depredations. They strip the bark and shoots from off the sapling trees, and root up the newly-planted acorns; nor are they less injurious in wheat-fields. Each individual lays up in its hole or burrow a winter store of food, consisting of grain, acorns, nuts, peas, &c.; and hence it is not only from what they devour at the time, but also from what they carry away that they cause such injuries. In the kitchen garden, as we can personally testify, they are not a little annoying, digging up peas and beans when newly sown or when beginning to germinate. One of their natural enemies, and one of the most efficient agents in their destruction, is the short-eared owl (*Otis Ulula*). Latham informs us that in certain districts which have been infested with these mice, the "owls have collected in large troops, and attacked the depredators, to their utter extermination." It is not exclusively to vegetable matters that these mice confine their diet; young birds become their prey, and when food is scarce they will attack each other, the younger or weaker falling victims to the more powerful.

The field mouse, though extremely timid, is easily tamed and rendered familiar, and its manners are very engaging. It is free from the unpleasant odour which renders the common mouse a nuisance. The field mouse breeds twice in the year, producing from six to ten young at a time. It is easy, therefore, to calculate the rapidity of its multiplication, and to account for the sudden appearance of swarms in spots where few had been previously observed. Buffon states that by means of a single trap two thousand three hundred were killed in twenty-three days, in a single field of about forty acres in extent. In some parts of our own country their numbers have been incalculable and their devastations frightful.

The Short-tailed Field Mouse

(*Arvicola agrestis*; *Campagnol*, Buffon; *Arvicola arvalis*, Selys-Longchamps).

The short-tailed field mouse (or Field-vole of Bell) is one of those Rodentia from which we often receive ex-

tensive injury, proving how necessary it is that, in order to keep their numbers within due bounds, an incessant warfare be maintained against them,—a warfare to which birds and beasts of prey are appointed.

This species is a native of the greater part of Europe, and is common in our island, where its depredations (and in France and in other parts of the Continent the same may be said) have rendered it notorious. It is exclusively a tenant of woods, plantations, corn-fields, and meadows; and not unfrequently appears in enormous multitudes. Often is the farmer disappointed of his crop of wheat, the newly-sown grain having been all rooted up and devoured by an army of these "wee cowerin' creepin timorous beasties," formidable not from their individual size, but their numbers. Whole plantations of young trees have in like manner been destroyed, the root of every sapling being eaten, or the bottom of the stem barked around. In the years 1813 and 1814 the ravages of these animals in the New Forest and the Forest of Dean were so great as to create an alarm lest the whole of the young trees in those extensive woods should be destroyed by them. In the first vol. of the 'Zool. Journal' is a letter from Lord Glenbervie to Sir Joseph Banks, entering into a detailed account of the devastations committed. Mr. Jesse, in his 'Gleanings,' referring to the plantations in these forests, says, that soon after their formation "a sudden and rapid increase of mice took place in them, which threatened the destruction of the whole of the young plants: vast numbers of these were killed, the mice having eaten through the roots of five-year-old oaks and chestnuts, generally just below the surface of the ground. Hollies also, which were five or six feet high, were barked round the bottom, and in some instances the mice had crawled up the tree and were seen feeding on the bark of the upper branches. In the reports made to government on the subject, it appeared that the roots had been eaten through wherever they obstructed the runs of the mice."

Various plans were adopted for their destruction; and in holes dug purposely to entrap them, in the Dean

37.—Short-tailed Field Mice.

Forest alone 30,000 mice were caught in about three months, and a much greater number destroyed by stoats, weasels, kites, hawks, owls, crows, &c., and also by cats purposely turned out. In the New Forest about the same number were also destroyed, and it was calculated that the total destruction, including those caught in pits and traps, and those killed by other animals, and by their own species (for when their food fell short they attacked and devoured each other), amounted in the two forests to more than 200,000.

The field-vole measures four inches one line in the length of the head and body, and one inch three and a half lines in that of the tail. The fur is reddish brown above, gray beneath. (Fig. 37.) A distinct species, the Bank-vole (*Arvicola pratensis*, Baillon; *A. riparica*, Yarrell; *A. rufescens*, Selys-Longchamps) is found on the Continent, and in some parts of England. It is less than the former species, with a longer tail, and differs in several particulars in its internal anatomy.

The Harvest Mouse (*Mus messorius*).

Of all our British mammalia the harvest mouse is the smallest. This beautiful little species was first discovered in our island by Gilbert White, and described in his 'Natural History of Selborne.' Yet it is by no means uncommon in the corn counties, and especially in Hampshire, though so long overlooked by British naturalists. It is found in Wiltshire, Gloucestershire, Devonshire, and Cambridgeshire, and occurs in France, Germany, Russia, and Siberia. It is the *Mulot nain* and *Rat de moissons* of F. Cuvier; the *Mus minutus* of Pallas, and the *Mus pendulinus* of Hermann.

The harvest mouse is a lively, active, playful little creature: its eyes are dark; its general colour above is delicate reddish-fawn; the under parts are abruptly white; the ears are short and rounded; the tail is rather shorter than the body. Length of head and body two inches six lines. (Fig. 38.)

This animal lives entirely in the fields, resorting in the winter to burrows of its own construction, or to corn-ricks, into which it penetrates, and there finds food and shelter. The asylum in which it rears its young is an artful and beautiful nest of a spherical figure, consisting of the split leaves and panicles of grasses artificially interwoven together, and suspended among the stalks of standing corn, on thistles, or other plants, to which it is secured, and of which the leaves will shroud it from notice. (Fig. 39.)

According to Dr. Gloger, the entrance to the nest is

rather below the middle, on the side opposite to the stems, and is scarcely observable; the parent closes it when she leaves the nest, and probably while she remains herself within. The inside is warm, smooth, and neatly rounded. One nest examined by Dr. Gloger contained five young, another nine.

38.—Harvest Mouse.

It would appear that the harvest mouse is insectivorous as well as granivorous, and this fact was first noticed by the Rev. W. Bingley, who obtained a female, which after its capture produced eight young, but being disturbed by a conveyance of several miles, she killed them, as the rabbit is frequently known to do. "One evening,"

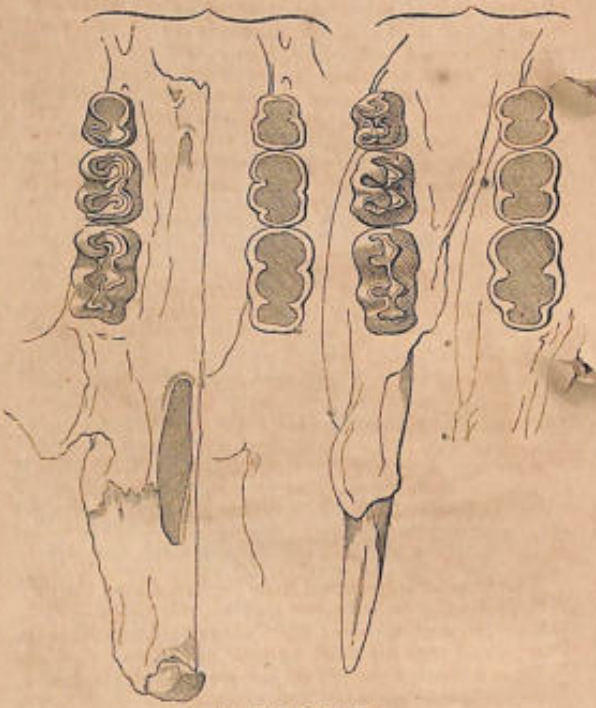
39.—Harvest Mouse.

he observes, "as I was sitting at my writing-desk, and the animal was playing about in the open part of its cage, a large blue fly happened to buzz against the wires; the little creature, although at twice or thrice the distance of her own length from it, sprang along the wires with the greatest agility, and would certainly have seized it had the space between the wires been sufficiently wide

to have admitted her teeth or paws to reach it. I was surprised at this occurrence, as I had been led to believe that the harvest mouse was merely a granivorous animal. I caught the fly, and made it buzz in my fingers against the wires. The mouse, though usually shy and timid, immediately came out of her hiding-place, and running to the spot, seized and devoured it. From this time I fed her with insects whenever I could get them, and she always preferred them to every other kind of food that I offered her." The same writer observed that the tip of the tail possessed a prehensile power, and that the animal used it while climbing about the wires of its cage. We have seen the harvest mouse in captivity tolerably tame, and reconciled to its prison. It often sits erect, and feeds itself, holding grain between its paws, which it also uses in dressing its soft fur. It drinks by lapping the water with its tongue, and sleeps rolled up into a ball.

THE HAMSTER (*Cricetus vulgaris*).

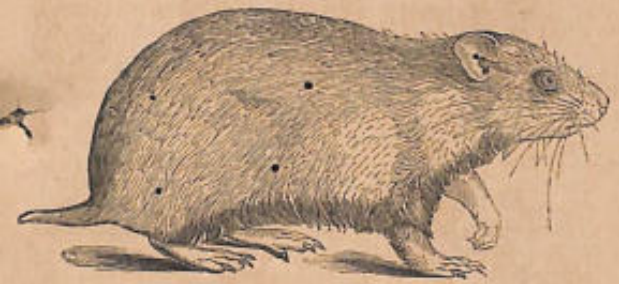
Fortunately for England the hamster is not indigenous within the precincts of the island. It inhabits the whole tract of countries extending between the Rhine and the Ural Mountains, and between the German Sea and Baltic to the north and the Danube to the south, wherever it finds a congenial soil. It is very common in Thuringia. Its proper soil is a deep alluvial mould with a substratum of clay; in dry, strong-soiled, or stony districts, it is not often found. The teeth of the hamster closely resemble those of the rat. (Fig. 40.) The tail is short and hairy. There are large cheek-pouches, as in some of the monkeys, in the form of sacs, which serve for carrying home food: they extend from the inside of the cheeks beneath the skin, along the sides of the neck, even over the shoulders. The general figure is thick: the limbs are short; there are four toes and a small thumb on the anterior feet; five toes on the hind-feet; the head is large, the muzzle abruptly pointed, the ears rounded. The general colour is as follows: head and upper parts reddish-gray, verging to yellow on the face;



40.—Teeth of Hamster.

under parts black, with the exception of the throat and feet, which are white. Three large distinct spots of white are also disposed on each side, one on the cheeks, one on the shoulder, and one on the ribs. Black varieties are not unfrequent: in these the nose and feet are white. There are two oblong spaces on the skin, situ-

ated one on each side of the spine, at a short distance in front of the thighs, which, instead of having the usual fur, are covered with short, brown, stiff hairs. These patches, which are about an inch long, are not always directly perceptible, being obscured by the surrounding long fur, which must be blown aside to show them. The adult male measures from nine to twelve inches, exclusive of the tail, which is about three inches long. The weight is sometimes more than a pound. The female is smaller by one-fourth. (Fig. 41.)



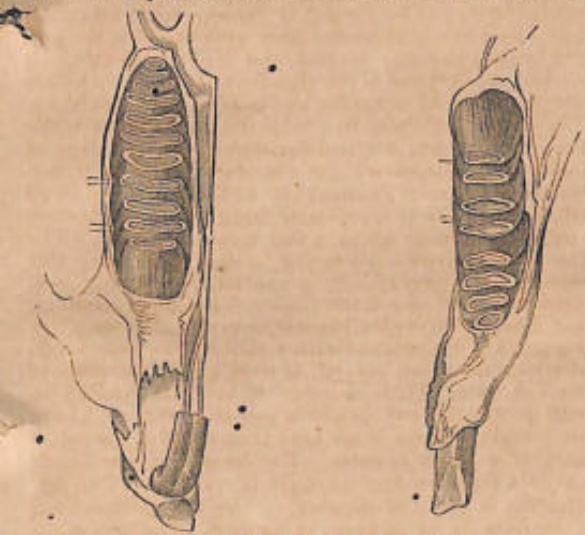
41.—Hamster.

The hamster is nocturnal in its habits: during the day it lies rolled up in its burrow; at night it issues forth to ramble in quest of food; after midnight it returns to its burrow and rests till about an hour before sunrise, when it takes a second ramble till the morning fairly dawns. Its movements are slow and creeping: it often utters short growling tones, but when irritated its voice is a shrill yelling cry. In collecting food, as beans, peas, wheat, &c., it uses its paws to press the grain backwards to the bottom of the pouches, in order to make room for the entrance of more. When these are well filled, it returns to its burrow to unload them, in which act it again uses its paws. In summer it feeds upon green fodder and the leaves of many plants; but the hamster

is also carnivorous, attacking and devouring rats, mice, birds, lizards, insects and their larvæ, and the weaker of their own species. Even the two sexes live in harmony only during the few days of each breeding-season. The hamster fights obstinately, and will jump with equal fury at a waggon-wheel or at a horse if he tread near it; and when two rival males meet, they engage in a desperate conflict till one retreats or perishes. In these paroxysms of fury the cheek-pouches become distended with air, the animal at the same time blowing and uttering at intervals its shrill cry.

In the construction of its burrows the hamster displays great ingenuity. They are in some respects modified according to age, sex, and soil; for each individual has its own exclusive burrow. Each burrow has at least two openings, one descends obliquely, the other perpendicularly. The former is termed the "creeping-hole," and this is excavated from without,—but the perpendicular passage, termed the "plunging-hole," is worked out from one of the chambers, that is, from within the subterranean domicile, and is often four feet deep. The distance of these two holes from each other varies from four to ten feet, and between the termination of these two passages are the chambers. The creeping-hole is not in such constant use as the other, and in an inhabited burrow it is regularly found stopped with earth at the distance of about a foot from the mouth. The chambers are more or less oval, and of large size: that nearest the creeping-hole is the smallest, and is well lined with a bed of soft fine straw: it has three openings, one into the creeping-passage, one into the plunging-passage, and one communicating with the store-chambers, of which there are several, at least in the burrows of the old male. Each chamber is filled in the autumn with provisions, and sixty-five pounds of corn or a hundredweight of horse-beans have been found in the magazines of a single hamster. The burrow of the female has from three or four to eight plunging-holes, all terminating in her nest-chamber. Here she produces her litter, from six to eighteen in number. The young are

born blind and naked, but in eight or nine days their eyes are opened: they grow rapidly, and in about a fortnight begin to dig small burrows, each making its own. The female has several litters in the course of the year. About the middle of October, the hamster retires for good to its retreat, stopping up first the creeping-holes, then the plunging-holes;—after this the animal keeps awake (though underground) for about two months, living on its store, and becoming very fat. When the cold of winter has fairly set in and reached it, it sinks into a complete state of torpor, which continues till the middle of February. About the middle of March it begins to open its passage and re-visits the fields: it now abandons its old burrow, and begins to form a new one. The flesh of the hamster is said to be very good; the



42.—Teeth of Caffre Broad-eared Rat.

fur is also esteemed,—and the hamster-hunter, who trades in the skins, usually opens the burrows after the corn has been reaped, for the sake of obtaining the grain which the hamster has accumulated.

The Caffre Broad-eared Rat

(*Euryotis unisulcatus*?

This species of rat is a native of South Africa, whence it was brought by M. Delalande. It forms the type of the genus *Euryotis* of Brands, to which title that of *Otomys*, proposed by F. Cuvier, must give place. Dr. A. Smith has appropriated the term *Otomys* to another group of Rodents. In its dentition (Fig. 42) this ani-

43.—Caffre Broad-eared Rat.

mal closely approximates to the true rats, as also in general form and structure: the eyes are large; the ears are ample and broad, and furnished with an internal projecting membrane, which when its edges are approximated entirely shuts the entrance of the auditory opening. The fur is thick and soft, and the general tone of colouring is a clouded yellow tint, becoming yellowish-white on the under parts. Length of head and body about six and a half inches; of tail, nearly three inches. (Fig. 43.) Of the habits and manners of this animal we have no definite information.

The Hydromys

(*Hydromys leucogaster* and *chrysogaster*).

Though we refer the genus *Hydromys* to the *Muridæ*, it differs in dentition from the other members of that

44.—Teeth of Hydromys.

45.—Hydromys.

family. There are only two molars on each side above and below; the first above is three times the size of the second, and is composed of three irregular portions, each portion being depressed in its centre, which is surrounded by a ridge of enamel; the second molar is composed of two unequal parts: the first molar below is twice the size of the second, and both are composed of two parts. (Fig. 44.) The *Hydromys* is an aquatic animal, and well adapted for swimming: the head is flat; the body otter-like, elongated, and covered with close glossy fur: on the fore-feet there are four toes and the rudiment of a thumb: on the hind-feet there are five toes united by webs. The tail is long and cylindrical, covered with close stiff hairs; the ears are short and rounded; the upper surface is brown, the extremity of the tail for about a third of its length white: the under surface varies from white to a fine deep orange-yellow. (Fig. 45.) Some writers have regarded these varieties

as distinct species;—we have seen specimens with the colour of the under surface in intermediate stages between white and yellow. Length of head and body about twelve inches; that of the tail nearly as much. The *Hydromys* is a native of Van Diemen's Land and various small islands in D'Entrecasteaux Channel; but of its habits we have no detailed accounts.

The family *Arvicolidæ*.—In this family are comprehended the Water-Rat, the Lemming, and other Rodents, termed Campagnols, Voles, &c., distinguished from the *Muridæ* by having rootless molars, by having the angle of the lower jaw raised, and by certain peculiarities in the structure of the cranium.

THE ECONOMIST MOUSE (*Arvicola œconomus*).

In the genus *Arvicola* the molars are $\frac{3-3}{3-3}$ composite with flat crowns, presenting angular enamelled laminæ. (Fig. 46.) The ears are moderate, the muzzle obtuse, the tail shorter than the body, and hairy. The Economist mouse is a native of the northern sweep of Siberia, and Kamtchatka. It would appear that the same or a closely-allied species inhabits Iceland. It is a burrowing animal, and constructs beneath the turf narrow galleries which lead to a chamber, in the form of an oven, communicating with another used as a magazine, in which it stores up food for winter consumption. This consists of bulbous roots, and various grains and berries; and the quantity of provision amassed is often very considerable. These animals breed several times in the year, producing three or four at a birth. Like the lemming, from some unknown cause, these mice, at irregular periods, but always in the spring, perform extensive migrations. Multitudes assemble together, forming an army myriads strong. In Kamtchatka their progress is westward; neither rivers, nor lakes, nor even arms of the sea stop them; thousands are drowned or destroyed by birds and beasts of prey,—but onwards the army marches,—pur-

suing their course, until they have crossed the river Penshim, when they bend their way towards Judoma and Ochot, which they usually reach about July: they return to Kamtchatka in October, but sadly reduced in numbers by the accidents of flood and field. According to Dr. Henderson the Economist mouse of Iceland dis-

46.—Teeth of Economist Mouse.

plays great sagacity in conveying home and stocking its provisions; and he corroborates the account of MM. Olafsen and Povelsen respecting their mode of conveying them across such streams as they may meet with in their foraging expeditions. "The party, which consists of

47.—Economist Mice.

from six to ten, select a flat piece of dried cow-dung, on which they place the berries in a heap in the middle; then by their united force they bring it to the water's edge, and, after launching it, embark and place themselves round the heap with their heads joined over it, and their backs to the water, their tails pendent in the stream serving the purpose of rudders." (Fig. 47.) The truth of this fact he says was confirmed by the testimony of two credible witnesses, the clergyman of Briämslœk, and Madame Benedictson, of Stickesholm. He further states that they make a drainage from their burrow, leading into a deep hole, intended for the reception of the water.

The Water-Rat

(*Arvicola amphibia*; *Rat d'eau*, Buff.).

The water-rat is by many regarded as a variety of that destructive animal the common rat, which, as is well known, often takes up its quarters in drains and ditches, and the banks of canals, especially near houses, farms

stables, &c., making deep burrows in which to rear its young. From this pest the water-rat is totally distinct. It frequents the borders of large ponds, reservoirs, streams, and rivers, dwelling in burrows of considerable extent, to which there are generally two or more outlets. The main outlet is in most instances close to the water's edge, so that during floods it is not unfrequently below the surface, but the gallery, sloping upwards as it proceeds in the bank, terminates in a chamber which the water does not reach. Here, in a snug bed of dried grass and vegetable fibres, the female rears her young. Nocturnal or crepuscular in its habits, it is chiefly as the dusk of evening steals on that the water-rat emerges from its retreat, but it seldom ventures far from the margin of the pond or river, into which when alarmed it immediately plunges, and swims under the cover of overhanging roots and herbage to its burrow. Though not web-footed, it is at home in the water, and dives with great ease. There are few persons who have not noticed its waymarks on the surface of stagnant ponds or ditches mantled over with a thick crop of chickweed. These tracks are made during the night, the season in which it wanders in search of food or its fellows. The roots of aquatic plants, especially the typha, the stems of equisetum, buds and bark, &c., constitute the diet of this species: it has been affirmed that it feeds also upon insects, small fishes, frogs, &c., but for this assertion there is not the slightest foundation. It would appear that the water-rat hybernates during some portion of the winter, and also lays up a store of food. Mr. White says, "As a neighbour was lately ploughing in a dry chalky field, far removed from any water, he turned out a water-rat that was curiously laid up in an hybernaculum artificially formed of grass and leaves. At one end of the burrow lay above a gallon of potatoes regularly stowed, on which it was to have supported itself for the winter." It must be acknowledged that there are some points in the history of this species to be cleared up. In size this animal equals the common brown rat, but the head is thicker and more obtuse, the muzzle being blunt and short; the

ears are scarcely apparent, being buried in the fur; the eyes are small and black; the tail is little more than half the length of the body, and thinly covered with short hairs. The fur is thick and close; its colour on the upper parts is dark reddish-brown mixed with gray; on the under surface brownish-white: a black variety sometimes occurs. (Fig. 48.) The species is spread over most parts of Europe.

48.—Water-Rat.

The Beaver (*Castor Fiber*).

The Beaver is not exclusively confined to the northern portions of the American continent. Erman (see 'Journey round the Earth,' &c.) informs us that it "abounds in the Obi, and is taken, not for the sake of

its fur, but for its musk, which bears a very high price." It is common along the Euphrates, and a skin sent home by Col. Chesney is in the possession of the Zool. Soc. Lond. The beaver occurs also along some of the larger rivers of Europe, as the Rhône, the Danube, the Weser, and the Nuthe, near its confluence with the Elbe. It was formerly an inhabitant of our own island, and Giraldus Cambrensis gives us a short account of their manners in Wales; but in his time (1188) they were only found in the river Teify. By the laws of Hoel-dda, the price of a beaver's skin was fixed at 120 pence, a great sum in those days. Whether the European, Asiatic, and American beavers are specifically identical or not, yet remains to be determined. Certain it is that the European beaver, as proved by the little colony in the Nuthe, displays the same manners and building propensities as its transatlantic brethren; and per contra, the thinly scattered beavers, near the settlements in America are solitary animals, dwelling in burrows like the scattered few along the Rhône, though it must be observed that one from the latter river in captivity exhibited as marked a constructive disposition as any American beaver under the same restrictions. The mode of building as conducted by the beaver of America is described by Hearne with great clearness and the absence of the ordinary exaggeration. The situation chosen is various: where the beavers are numerous, they tenant lakes, rivers, and creeks, especially the two latter, for the sake of the current, of which they avail themselves in the transportation of the materials. They also choose such parts as have a depth of water beyond the freezing-power to congeal at the bottom. In small rivers or creeks in which the water is liable to be drained off when the back-supplies are dried up by the frost, they are led by instinct to make a dam quite across the river, at a convenient distance from their houses, thus artificially procuring a deep body of water in which to build. The dam varies in shape: where the current is gentle, it is carried out straight; but where rapid it is bowed, presenting a convexity to the current. The materials used

are drift-wood, green willows, birch, and poplars, if they can be got, and also mud and stones; these are intermixed without order, the only aim being to carry out the work with a regular sweep, and to make the whole of equal strength. Old dams by frequent repairing become a solid bank, capable of resisting a great force of water and ice, and as the willows, poplars, and birches take root and shoot up, they form by degrees a sort of thick hedge-row, often of considerable height. Of the same materials the houses themselves are built, and in size proportionate to the number of their respective inhabitants, which seldom exceeds four old and six or eight young ones. The houses, however, are ruder in structure than the dam; the only aim being to have a dry place to lie upon, and perhaps feed in. When the houses are large, it often happens that they are divided by partitions into two or three or even more compartments, which have, in general, no communication, except by water; such may be called double or treble houses, rather than houses divided. Each compartment is inhabited by its own possessors, who know their own door, and have no connexion with their neighbours, more than a friendly intercourse, and joining with them in the necessary labour of building. So far are the beavers from driving stakes, as some have said, into the ground when building, that they lay most of the wood crosswise, and nearly horizontal, without any order than that of leaving a cavity in the middle; and when any unnecessary branches project inward, they cut them off with their chisel-like teeth, and throw them in among the rest to prevent the mud from falling in. With this wood is mixed mud and stones, and the whole compacted together. The bank affords them the mud, or the bottom of the creek, and they carry it, as well as the stones, under their throat by the aid of their fore-paws; the wood they drag along with their teeth. They always work in the night, and have been known during the course of a single night to have accumulated as much mud as amounted to some thousands of their little handfuls. Every fall they cover the outside of their houses with fresh mud, and as

late in the autumn as possible, even when the frost has set in, as by this means it soon becomes frozen as hard as stone, and prevents their most formidable enemy, the wolverene or glutton, from disturbing them during the winter. In laying on this coat of mud they do not use their broad flat tails, as has been asserted—a mistake which has arisen from their habit of giving a flap with the tail when plunging from the outside of the house into the water, and when they are startled, as well as at other times. The houses when complete have a dome-like figure, with walls several feet thick, and emerging from four to six feet above the water. The only entrance is deep under water, below a projection called the "angle" by the hunters, and beyond the reach of the frost: near this, also under water, is laid up their winter store, a mass of branches of willows and other trees, on the bark of which they feed. These they stack up, sinking each layer by means of mud and stones, and often accumulating more than a cartload of materials. Besides these winter-houses, in which they are shut up during the severities of the season, they have always a number of holes in the banks which serve them as places of retreat when any injury is offered to their houses, and in these they are generally taken. The entrance to these holes is deep below the water, which fills a great part of the vault itself. When the hunter forces the houses of the beaver in winter (the hunting season), the animals swim beneath the ice to these retreats, the entrances of which are discovered by striking the ice along the banks with an iron ice-chisel, the sound indicating to practised ears the exact spot: they cut a hole in the ice and surprise their booty. During the summer the beavers roam about at pleasure, and it is during this season that they fell the wood necessary for repairing their houses and dams, or for building others, commencing the latter about the end of August. Such is the strength and sharpness of their teeth, that they will lop off a branch as thick as a walking-stick at a single effort, and as cleanly as if cut with a pruning-knife. Larger stems they gnaw all round, taking care that their fall shall be towards or into the water.

They rapidly fell a tree the shaft of which is as thick or thicker than a man's thigh, or from six to ten inches in diameter; and places of more than three acres in front of the river and one in width have been seen with the timber all felled by these animals, though many of the trees were as thick as a man's body.

The beaver does not attain its full growth before three years, but it breeds before that time. It produces from two to six at a birth. The flesh of this animal is esteemed by the Canadian hunters, and by the natives, as

49.—Beaver.

a great delicacy, and we need not say how valuable its fur is as an article of commerce. It is from certain glandular sacs in the beaver that the substance called castor, or castoreum, used in medicine, is obtained, and which (procured from the European variety) was well known to the ancients.

In captivity the beaver soon becomes familiar and sociable, and, if permitted, will even in a room exercise itself in attempts to build, using brushes, baskets, boots, sticks, and in short anything it can get hold of for the purpose.

The fine fur of the beaver varies from glossy brown to black; the tail, or caudal paddle, used as a rudder in diving or in ascending, is flat, scaled, and oarlike. The length of the head and body of a full-grown animal is about forty inches; of the caudal paddle, one foot. The feet are all five-toed; those of the hind-feet are united by a broad palmated expansion; the nails are strong, and that of the second toe of the hind-feet consists of two portions. On land the gait of the beaver is awkward and shuffling, owing in part to the outward tournure of the hind-feet, which fits them for aquatic progression, and in part to the thick and clumsy configuration of the body. (Fig. 49.) The genus Castor is somewhat isolated, and may be regarded as the type of a subfamily.

The Musquash

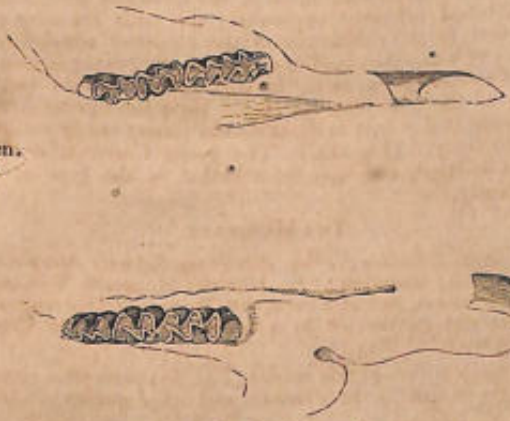
(*Ondatra Zibethica; Fiber Zibethicus*, Sabine; *Musk-rat*, Godman; Ondathra of the Hurons; Musquash, Watsuss, or Wachusk, and also Peesquaw-Tupeyew ("the animal that sits on the ice in a round form") of the Cree Indians).

The dentition of this animal (Fig. 50) presents a close affinity to that of the water-rat and other species of *Arvicola*, as in Fig. 46. Molars, $\frac{3-3}{3-3}$.

The musquash is a native of North America, and in its general form it resembles the common water-rat, size excepted. In the length of the head and body it measures about fourteen inches, that of the tail being eight or nine. The fur, which is much like that of the beaver, is dark umber brown passing into brownish yellow on the under parts: pied and even white varieties are sometimes seen. The hind-feet are not webbed; the tail is

compressed laterally, broadest in the middle and covered with a thin sleek coat of short hairs; longer hairs run along the acute margins. (Fig. 51.)

The range of this animal is from lat. 30° as high north as 69°. Small grassy lakes or swamps, or the grassy borders of slow streams, are its favourite haunts. Vegetable matters are its principal food, as roots, tender shoots, the leaves of various carices, &c.; to which it adds fresh-water mussels (*Unio*). The musquash swims and dives well, plunging into the water on the least



50.—Teeth of Musquash.

alarm, and diving instantaneously on perceiving the flash of a gun. This animal builds winter habitations, but far less solid and durable than those of the beaver. These habitations are thus described by Dr. Richardson:—"In the autumn, before the shallow lakes and swamps freeze over, the musquash builds its house of mud, giving it a conical form, and a sufficient base to raise the chamber above the water. The chosen spot is generally amongst

51.—Musquash.

long grass, which is incorporated with the walls of the house from the mud being deposited amongst it, but the animal does not appear to make any kind of composition or mortar by tempering the mud and grass together. There is, however, a dry bed of grass deposited in the chamber. The entrance is under water. When ice forms over the surface of the swamp, the musquash makes breathing-holes through it, and protects them from the frost by a covering of mud. In severe winters, however, these holes freeze up in spite of their coverings, and many of the animals die. It is to be remarked that the small grassy lakes selected by the musquash for its residence are never so firmly frozen nor covered with such thick ice as deeper and clearer water. The Indians kill these animals by spearing them through the walls of their houses, making their approach with great caution,

for the musquashes take to the water when alarmed by a sound on the ice. An experienced hunter is so well acquainted with the direction of the chamber and the position in which its inmates lie, that he can transfix four or five at a time. As soon as, from the motion of the spear, it is evident that the animal is struck, the house is broken down, and it is taken out. The principal seasons for taking the musquash are the autumn, before the snow falls, and the spring, after it has disappeared but while the ice is still entire. In the winter time the depth of snow prevents the houses and breathing-holes from being seen. One of the first operations of the hunter is to stop all the holes with the exception of one, at which he stations himself to spear the animals that have escaped being struck in their houses and come hither to breathe. In the summer the musquash burrows in the banks of the lakes, making branched canals many yards in extent, and forming its nest in a chamber at the extremity, in which the young are brought forth. When its house is attacked in the autumn, it retreats to these passages, but in the spring they are frozen up. The musquash may be frequently seen on the shores of small muddy islands, sitting in a rounded form, and not easily to be distinguished from a piece of earth, until, on the approach of danger, it suddenly plunges into the water. In the act of diving, when surprised, it gives a smart blow to the water with its tail. Its flesh is eaten by the natives, though it has a strong musky flavour. The fur is used for hat-making, and between four and five hundred thousand skins are annually imported into Great Britain. The musquash breeds three times in the year, producing from three to seven at a birth.

THE MOLE-RAT

(*Aspalomys Typhlus*, Laxmann; *Spalax typhlus*, Guldenst.; *Aspalax typhlus*, Desm.; Zemni, Rzaczinski; Slepez, Gmelin; Podolian Marmot, Pennant).

This strange animal (which forms the type of a distinct family) is expressly organized as a miner. The

body is mole-shaped and covered with close fur, the limbs are short and thick, with strong short claws. The head is broad and flat, with a lateral margin or ridge running from the great naked nose to the ears, and indicated by a line of white stiff hairs. Breadth of head across, 2⅝ inches; length the same. Total length eleven inches. Tail wanting. Teeth white: general colour pale sandy ash-gray; the hairs pale lead-colour at the base. The specimen from which these notes were made (in the Paris Museum) was brought from Russia ("le pays des Cosaques du Donn"): a second specimen, from Syria, was smaller; eight and a half inches long, with bright orange teeth, and the lateral ridge of the head not fringed with white hairs; its colour also was darker. (Fig. 52.)

52.—Mole-Rat.

The mole-rat is a native of Asia Minor, Syria, Mesopotamia, and Southern Russia between the Tanais and Volga. The Russians term it Slepez, or the blind; and the Cossacks, Sfochor Nomon, which has the same meaning. It is generally supposed to be the ἀσπάλαξ (*Aspalax*) of Aristotle; but as a species of mole inhabiting Europe (*Talpa cæca*) has the eyes also rudimentary, this point is doubtful. In the mole-rat the eye is a minute black grain lying beneath the skin, which passes over it, and is besides covered with the fur; it is evident that the sense of vision is denied to this creature; but by way of amends its internal organs of hearing are largely developed, and the external orifice is wide, though the conch of the ear is almost obsolete. The mouth is small; the tip of the nose is largely bare and cartilaginous, with the nostrils wide apart and placed below. The mole-rat has much of the manners of our common mole: it is gregarious, and its burrows are clustered together. Rich level plains are its favourite localities. Its burrows consist of galleries at a little distance below the surface of the earth, which communicate with chambers sunk to a greater depth. From its galleries it drives lateral passages in search of roots, particularly of the bulbous *Chærophyllum*, on which it feeds. According to Rzaczinski, it also devours grain, of which it amasses a store in its burrow for winter consumption. Its actions are sudden and quick, but irregular; and it moves along with equal ease both forwards and backwards. It burrows very expeditiously. In the morning it often quits its retreat and basks with its mate in the sun. At the least noise it raises its head to listen, and in a menacing attitude; when attacked, it snorts and gnashes its teeth, and defends itself resolutely, inflicting severe wounds. There is a superstition among the people of the Ukraine, that the hand which has suffocated one of these animals is gifted with the virtue of curing scrofulous affections.

The Canada Sand-Rat

(*Geomys bursarius*; *Mus bursarius*, Shaw).

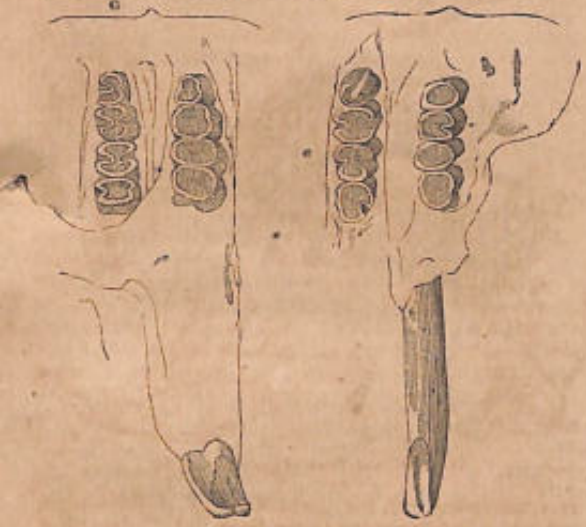
Fischer regards, and perhaps correctly, the genera *Saccophorus*, *Pseudostoma*, *Diplostoma*, and *Saccomys*,

53.—Skull and Teeth of Canada Sand-Rat.

as synonymous with the genus *Geomys* of Rafinesque, and which is represented by the Sand-Rat, distinguished by large cheek-pouches, which when full have an oblong form and nearly touch the ground, but when empty are retracted for three-fourths of their length. Their interior is very glandular, particularly the orifice that opens into the mouth. The incisors are $\frac{4-4}{4-4}$. Fig. 53 represents the skull and teeth of *Geomys*, as given by Dr. Richardson: 1, 2, 3, skull, natural size, in different

views: 4, lower jaw; 5, palate and upper teeth; 6, upper grinder magnified. Fig. 54 represents the teeth of *Geomys* (*Saccomys*, F. Cuv.) enlarged.

The skull is large and depressed, the nose short, the nasal and frontal bones are in the same plane; the palate is very narrow, and the zygomatic arch is but little depressed below the upper surface of the skull.



54.—Teeth of Canada Sand-Rat.

The nostrils are somewhat lateral; the mouth is contracted; the pendulous cheek-pouches are thinly clothed with short hairs, and sometimes almost naked—they open into the mouth by the side of the molar teeth; auditory openings large, external ear almost obsolete; eyes small and far apart; body cylindrical; tail of moderate length, round, tapering, and more or less hairy. Limbs short; toes, five on each foot, with strong claws. (Fig. 55.)

55.—Canada Sand-Rat.

Dr. Richardson observes that the sand-rats burrow in sandy soils, and feed on acorns, nuts, roots, and grass, which they convey to their burrows in their cheek-pouches (Fig. 56); they throw up little mounds of earth, like mole-hills, in summer, but are not seen abroad in the winter season; speaking of the Columbia sand-rat, he observes, that when in the act of emptying its pouches it sits up like a marmot or squirrel, and squeezes the sacks against its breast with its fore-paws and chin. These animals commit great havoc on the potato-fields. The Canada sand-rat is known only from Dr. Shaw's description (in the 'Linnæan Transactions,' vol. v., p. 227) of a specimen in Mr. Bullock's Museum, and which afterwards passed into the hands of M. Temminck. There is no specimen in any of our museums; nor did Dr. Richardson see the animal in his expedition. It

56.—Canada Sand-Rat.

may, however, possibly prove to be identical with one of the species he has described. This animal is stated to be about the size of a common rat, and of a pale grayish brown. A specimen of the mole-like sand-rat (*G. talpoides*) is preserved in the collection of the Zool. Soc. It is a native of the borders of the Saskatchewan.

THE CAMAS POUCHED RAT (*Diplostoma bulbivorum*).

The animals of this genus differ from those of the genus *Geomys*, in having cheek-pouches which open ex-

ternally at the sides of the mouth, and are carried inwards and downwards along the side of the lower jaw; these pouches are not pendulous; the mouth is a vertical fissure nearly an inch long, entirely exposing the incisors; and the lateral fold of skin before the opening of the pouch is covered internally and externally with fur. The body resembles that of a great mole with a large clumsy head. (Fig. 57.)

The animals of this genus were termed "Gauffres" by the early French travellers: there appear to be several species.

The Camas pouched rat is common in N. America, on the banks of the Columbia river, and the Multnomah, where it is known under the name of Camas rat, because the bulbous root of the Quamash or Camas-plant (*Scilla esculenta*) forms its favourite food. It is eleven inches long, and of a chestnut-brown colour. These animals

57.—Camas Pouched Rat.

are excessively voracious, and they are very destructive to beets, carrots, and similar vegetables. They live almost exclusively under ground, working their way like a mole, and are said to fill their cheek-pouches with the earth by means of their paws, and to empty them of their contents at the mouth of the burrow.

58.—Teeth of Coast Rat.

THE COAST-RAT (*Bathiergus maritimus*).

The dental form of *Bathiergus* (*Orycterus*, F. Cuv.) is as follows: Molars $\frac{4-4}{4-4}$ (see Fig. 58). In this genus

are comprehended several species of mole-like Rodents peculiar to Africa, the whole form and organization of which fit them for an underground existence. The most remarkable is the coast rat, or sand-mole of the down. This species is a native of Southern Africa, frequenting sandy tracts along the coast. On the surface of the ground it proceeds slowly, but it burrows with great rapidity, and works out long galleries, throwing up hillocks as does the mole. In some districts these are extremely numerous, rendering it dangerous to pass over them on horseback, and not pleasant even on foot, the earth, where excavated, suddenly giving way. This animal is about a foot in length, exclusive of the tail, which is

59.—Coast Rat.

about three inches. (Fig. 59.) The incisors are of enormous size, and those above have a deep longitudinal furrow down the front; and a hairy palate extends behind them. The general colour is grayish ash.

The Rabbit Cercomys.

This animal, which in shape resembles a rat, represents the genus *Cercomys*, closely allied to that of *Echymys*,

60.—Rabbit Cercomys.

containing the spiny rats. The molars are $\frac{4-4}{4-4}$ rooted.

The general colour of this species is deep brown above, paler on the sides and cheeks; all the under parts are whitish; the tail is long, like that of the rat; ears and eyes large. (Fig. 60.) It is a native of Brazil, but of its habits we have no detailed accounts. The teeth of the genus *Echymys* (a South American group) are figured in 61.

Cuming's Octodon

(*Octodon Cumingii*; *Dendrobius Degus*, Meyen).

The family *Octodontidæ* is established for a few allied genera peculiar to South America, of which that termed *Octodon* is the type. Molars $\frac{4-4}{4-4}$. The antorbital foramen is as large as the orbit, or nearly so. The de-

scending ramus of the lower jaw is deeply emarginated behind, and the posterior angle acute. Fig. 62 represents the skull of Octodon in different views; and the skull of an allied genus, *Ctenomys*, is given in Fig. 65.

Cuming's Octodon in size and shape resembles a water-rat. General colour brownish gray clouded with dusky black; under surface dusky gray; base of the tail beneath nearly white. (Fig. 63.)

61.—Teeth of Echymys.

These animals are exceedingly abundant in the central parts of Chile. They frequent by hundreds the hedge-rows and thickets, where they make burrows which communicate with one another. In the neighbourhood of Valparaiso multitudes may be seen together feeding fearlessly in the day-time. Sometimes they ascend the lower branches of small shrubs, but not often. They are very destructive to fields of young corn. On being dis-

turbed, they all run like rabbits to their burrows. When running they carry their tails raised up, more like squirrels than rats; and they also sit up like those animals. According to Molina they lay up a winter store of food, but do not become dormant. The *Octodon* is the Degu of that writer: he says that the Indians used formerly to eat them with much relish. Piebald and albino varieties are not uncommon. The greatest enemy of these active little creatures is a species of horned owl, which feeds chiefly upon them.

62.—Skull of Cuming's Octodon.

The Tucutuco (*Ctenomys Magellanicus*).

General colour brownish gray tinged with yellow and slightly varied by a blackish tint; under parts paler; chin and throat pale fawn. Length of head and body

63.—Cuming's Octodon.

about seven inches; of the tail about two inches and a quarter. Toes, as in *Octodon*, five on each foot. (Fig. 64.) The skull in different views is shown in Fig. 65.

Locality.—The east entrance of the Strait of Magalhaens at Cape Gregory and the vicinity. (King.) The wide plains north of the Rio Colorado are undermined by these animals; and near the Strait of Magalhaens, where Patagonia blends with Tierra del Fuego, the whole sandy country forms a great warren for them.

Mr. Darwin ('Journal and Remarks') gives a circumstantial account of this curious animal, which he well describes as a Rodent with the habits of a mole. "The

tucutuco," says that author, "is extremely abundant in some parts of the country, but is difficult to be procured, and still more difficult to be seen when at liberty. It lives almost entirely underground, and prefers a sandy soil with a gentle inclination. The burrows are said not to be deep, but of great length. They are seldom open; the earth being thrown up at the mouth into hillocks, not quite so large as those made by the mole. Considerable tracts of country are so completely undermined by these animals, that horses, in passing over, sink above their fetlocks. The tucutucos appear, to a certain degree, to be gregarious. The man who procured specimens for me had caught six together, and he said this

64.—Tucutuco.

65.—Skull of Tucutuco.

was a common occurrence. They are nocturnal in their habits; and their principal food is afforded by the roots of plants, which is the object of their extensive and superficial burrows. Azara says they are so difficult to be obtained, that he never saw more than one. He states that they lay up magazines of food within their burrows. This animal is universally known by a very peculiar noise which it makes when beneath the ground. A person, the first time he hears it, is much surprised; for it is not easy to tell whence it comes, nor is it possible to guess what kind of creature utters it. The noise consists

in a short, but not rough nasal grunt, which is repeated about four times in quick succession; the first grunt is not so loud, but a little longer, and more distinct than the three following: the musical time of the whole is constant, as often as it is uttered. The name Tucutuco is given in imitation of the sound. In all times of the day, where this animal is abundant, the noise may be heard, and sometimes directly beneath one's feet. When kept in a room, the tucutucos move both slowly and clumsily, which appears owing to the outward action of their hind-legs; and they are likewise quite incapable of jumping even the smallest vertical height. When eating they rest on their hind-legs and hold the piece in their fore-paws; they appear also to wish to drag it into some corner. They are very stupid in making any attempt to escape; when angry or frightened, they utter the tucutuco. Of those I kept alive, several, even the first day, became quite tame, not attempting to bite or to run away; others were a little wilder. The man who caught them asserted that many are found blind. A specimen which I preserved in spirits was in this state. When the animal was alive I placed my finger within half an inch of its head, and not the slightest notice was taken: it made its way, however, about the room nearly as well as the others."

THE UTIA

(*Capromys Furnieri*; *Isodon Pilorides*, Say).

Mr. Waterhouse considers the genus *Capromys* as one of those included in the *Histricine* section of Rodents. The anterior paws have four toes and a rudimentary thumb; the hind-feet are thick, broad, and strong, and five-toed; the claws are strong; the soles of all the feet are naked, and covered with a coarse granular black skin, divided into pads by deep fissures. The muzzle is obtuse; the nostrils are open, oblique, edged externally with an elevated rim, and separated by a medial furrow, running to the fissure of the upper lip. The whiskers are long; the tail is annulated with a scaly epidermis,

with short thinly-set hairs from between each scale. (Fig. 65*: *a*, muzzle; *b*, portion of tail; *c*, under part of fore-foot; *d*, under part of hind-foot.) The ears are moderate, erect, almost rounded. Molars $\frac{4-4}{4-4}$, with the crown traversed by folds of enamel. Eyes small.

This animal is a native of Cuba, where it is known by the name of Utia. It appears to have been described by Bomare and Oviedo three hundred years ago. The general colour of the utia is glossy brown grizzled with yellowish gray; the muzzle, chest, and under parts

65*.—Muzzle and Paws of Utia.

grayish white; the fur of a coarse texture; length about two feet two inches, of which the tail is eight inches. (Fig. 66.)

With respect to the habits of the utias in a wild state, it is only known that they are found in the woods, that they climb trees with great facility, and that they live on vegetables. From observations on those kept in a domesticated state, M. Desmarest gives the following de-

66.—Utia.

tails:—"Their intelligence appears to be developed to as great a degree as that of rats and squirrels, much more so than that of rabbits and guinea-pigs. They have, indeed, a great share of curiosity. At night they are very wakeful, and the form of the pupils is indicative of nocturnal habits. The sense of hearing does not appear to be so acute as that of rabbits or hares. Their nostrils are incessantly in motion, especially when they smell any new object. Their taste is sufficiently delicate to enable them to distinguish and reject vegetables which have been touched by animal substances, to which they manifest the greatest repugnance. They agree perfectly well together, and sleep close by each other. When they are apart they call each other by a sharp cry, differing little from that of a rat. Their voice, when

they express pleasure, is a low soft kind of grunting. They scarcely ever quarrel except for food—as when one piece of fruit is given between both; in that case one seizes and runs away with it, until the other is able to take it from him. They sometimes play for a long time together, holding themselves upright in the manner of kangaroos, firmly supported upon the broad soles of their hind-feet and the base of the tail, and striking each other with their paws, until one of them, finding a wall or some other body against which to support himself, acquires an additional power, and gains an advantage; but they never bite each other. Towards other animals they manifest the greatest indifference, paying no attention even to cats. They are fond of being caressed, and particularly of being scratched under the chin. They do not bite, but slightly press with the incisor teeth the skin of those who caress them. They do not ordinarily drink, but occasionally suck up water as squirrels do. Their food consists of vegetables exclusively, such as cabbage, succory, grapes, nuts, bread, apples, &c. They are not very difficult in the choice of their food, but still have a particular fondness for strong-flavoured herbs and aromatic plants, as wormwood, rosemary, geraniums, pimpernel, celery, &c. Grapes pleased them much, to obtain which they would instantly climb up a long pole, at the top of which the fruit was placed. They are also fond of bread steeped in aniseed or even wine. These animals are plantigrade: their movements are slow, and their hinder parts are embarrassed when they walk, as is observable in the bear. They leap occasionally, turning suddenly round from head to tail like the field-mouse. When they climb, which they do with the greatest ease, they assist themselves with the base of their tail as a support, and the same in descending. In certain positions, on a stick for example, the tail serves as a balance to preserve their equilibrium. They often raise themselves to a listening attitude, sitting erect, with the paws hanging down, like rabbits and hares. In eating they employ sometimes only one, sometimes both their fore-paws; the former is the case when the

substance they are holding is small enough to be held between the fingers and the tubercle at the base of the thumb."

The Coypu

(*Myopotamus Coypus*; Quoiya, D'Azara; Coní, Molina; *Hydromys Coypus*, Geoff.; *Mus Castorides*, Burrow).

The coypu is common in certain districts of South America, as Chile, Buenos Ayres, and Tucuman. The head is large; the muzzle obtuse; the ears small and

67.—Teeth of Coypu.

round; fore-feet with a rudimentary thumb and four toes, all free: hind-feet plantigrade, with five toes, of which the outermost only is free, the rest palmated. Tail strong and scaly, and sprinkled with scattered hairs.

68.—Coypu.

Molars $\frac{4-4}{4-4}$, increasing in size from the first to the last, with winding folds of enamel. (Fig. 67.) The eyes are small, approximating to each other, and placed high in the head. Behind the upper incisors there is a hairy palate or space, a peculiarity noticed also in *Bathiergus*. The body is clothed with two sorts of hair, an undergarment of fine close fur almost water-proof, and an upper layer of long, shining, straight hairs of a rich brown, which is the general colour, the muzzle being dirty white. The limbs are short, but strong; and the movements of the animal on land are slow and crawling. (Fig. 68.)

The coypu remained unknown to the scientific world, while thousands of its skins, under the name of Racoonda, for more than forty years had been annually imported into Europe, for the sake of the fine under-fur, which, like that of the musquash and beaver, is extensively used in the manufacture of hats.

This animal is gregarious and aquatic, residing in burrows which it excavates along the banks of rivers: and in these burrows the female produces and rears her young, from three or four to seven in number, to which she manifests great attachment. In the Chonos Archipelago, according to Mr. Darwin, "these animals, instead of inhabiting fresh water, live exclusively in the bays or channels which extend between the innumerable small islets of that group." "The inhabitants of Chiloe, who sometimes visit this archipelago for the purpose of fishing, state that these animals do not live solely on vegetable matter, as is the case with those inhabiting rivers, but that they sometimes eat shell-fish. The coypu is said to be a bold animal, and to fight fiercely with the dogs employed in chasing it. Its flesh when cooked is white and good to eat. An old female procured on these islands weighed between ten and eleven pounds." An extensive trade in the skins of these animals is carried on at Buenos Ayres, where they are improperly called "Nutrias," or otters. In captivity the coypu soon becomes gentle and attached; and is evidently pleased with marks of attention from those with whom it is familiar. Length of adult male, one foot eleven inches, exclusive of the tail, which is one foot three inches.

Family—HISTRICIDÆ, (or Porcupines).

The porcupines, a spine-clad family, are divided into the genera *Hystrix*, *Erethizon*, *Synetheres*, &c., and are respectively distributed over Europe and North Asia, Africa, India and its islands, and North and South America. All the porcupines have the molars four in each jaw on each side; nearly equal in size, and furnished with distinct roots; when worn the surfaces

69.—Teeth of Hystrix.

present tortuous folds of enamel (see Fig. 69, the teeth of *Hystrix*, and Fig. 70, the teeth of *Erethizon*). The tongue is rough with papillæ, like those of the cats; the head is short and blunt; the nostrils large and open; the ears and eyes comparatively small; and the general form thick and clumsy.

Two figures of skulls (Fig. 71 and 72) represent the skull of a species termed, by F. Cuvier, *Acanthion Javanicum*, and that of the common porcupine by way of comparison. With respect to the genus *Acanthion*, founded by F. Cuvier on the characters of two skulls, one of which was brought from Java, we are strongly inclined to consider it identical with the genus *Atherura* of Baron Cuvier, though the latter, in his 'Règne

70.—Teeth of Erethizon.

Animal,' makes no allusion to the genus proposed by his brother. Fischer gives the *Acanthion Javanicum* of F. Cuvier as identical with the fasciculated porcupine (*Atherura fasciculata*), and is probably correct. The fasciculated porcupine has been long known to science, and is figured by Buffon as the "Porc-épic de Malacca;" but since his time, till within the few last years, no specimen had reached Europe. In 1828 M. Diard sent a skin and skeleton to France, from India, and about the

same time a living individual was brought to England by Lieut. Vidal, and presented to the Zool. Soc. Lond. It was described and figured by Mr. Bennett, and now forms a part of the riches of the museum. This individual, however, was not brought from India or its islands,

71.—Skull of Acanthion Javanicum.

72.—Skull of Common Porcupine.

but from Fernando Po, where it is stated to be in such abundance as to furnish a staple article of food to the inhabitants. Whether it be truly indigenous there, or was originally brought by the early Portuguese settlers to that island from India or Java, and has become naturalized, are points unsettled.

The Common Porcupine (*Hystrix cristata*),

Porc-épic of the French: Istrice of the Italians; Stachelschwein, Dornschwein, and Porcopick of the Germans. This spine-covered animal is found in Italy, throughout Africa, in Southern Tartary, the borders of the Caspian Sea, Persia, and India: it was observed by Mr. Hodgson inhabiting the central and lower regions of Nepâl. When full-grown it is upwards of two feet in length; but the specimens from Italy are generally smaller than the African, and have shorter quills. (Fig. 73.) It would appear that in Italy it is not indigenous, but has become naturalized.

73.—Common Porcupine.

The porcupine is a nocturnal animal, of quiet and secluded habits, passing the day in its subterranean retreat, for the digging of which its muscular limbs and stout claws are well adapted. At night it steals forth to feed; roots, bark, fruits, and vegetables constitute its die

74.—Common Porcupine.

In winter it appears to undergo a partial hybernation. Sluggish and timid, the porcupine is yet enabled, clothed in his array of spears, to repel the assault of enemies: when driven to act on the defensive, he bends his head down, turns his back towards his assailant, erects his spines, and receiving the rash assault, pushes them forcibly by the action of the whole body against the aggressor. (Fig. 74.) The wounds thus inflicted are very severe, and do not heal readily. The spines of the porcupine are of two sorts: one sort being long, slender, and bending; the other spines, concealed beneath the former, are short, thick in the middle, and tapering to a sharp point; they are ringed black and white. The length of the short spines, which are the true effective weapons, is from four to ten inches, and the point, which consists of flint-like enamel, is somewhat compressed with two slightly raised and opposite ridges, which when minutely examined are found to be finely jagged. There is another sort of furniture on the tail, namely a number of

dry, hollow, open quills, of considerable circumference, and supported upon long and very slender stalks, which vibrate with every motion. When the porcupine clashes these together they produce a rustling noise. The apparatus by which the spines and these hollow rattles are clashed and raised consists of a strong muscular expansion underneath, and adherent to, the thick skin. From the raising and clashing of the spines, and perhaps the accidental falling of one looser than the rest (about to be shed naturally), has arisen the belief that the animal was capable of darting his spines, like a javelin, point foremost—an error we need not stay to confute.

The Brazilian Porcupine

(*Synetheres prehensilis*; *Cuandu* of Marcgrave; *Coendu*, Buffon; *Prehensile Porcupine* of Pennant).

In North America the porcupines are represented by the Hairy or Canada Porcupine (*Erethizon dorsatum*), which is in a great degree arboreal in its habits. In Brazil we are presented with the species termed Cuandu, more decidedly organised as a climber, having a prehensile tail resembling that of the opossum. The muzzle is broad and short; the head convex in front, the spines rather short; the tail very long, and naked for half its length. The feet have only four toes. The length of this species is about two feet, exclusive of the tail, which is about eighteen inches; the nose is covered with brownish hair; the ears are nearly naked; the body is covered above with spines; the longest (on the lower part of the back) are about three inches in length; those on the sides and base of the limbs are the shortest. All are sharp, and barred near their points and roots with white; brown in the middle. The basal half of the tail is clad with short spines; the breast, under parts, and lower portion of the limbs with dark brown bristles. (Fig. 75.)

The Brazilian porcupine appears very much to resemble the Canada porcupine in its habits, living in woods, sleeping by day, and feeding on fruits, &c. by

75.—Brazilian Porcupine.

night. Marcgrave states that its voice is like that of a sow. The quills are stated to have the same penetrating and destructive quality as those of the Canadian species. It is a sluggish animal, climbing trees very slowly, and holding on with its prehensile tail, especially in its descent. It grows very fat, and the flesh is said to be white and well-tasted. Our cut is taken from a specimen in the garden of the Zoological Society.

Col. Sykes regards the porcupine of the Dukhun, called "sayal" by the Mahrattas, as distinct from the ordinary species. It is nearly a third larger, and all the spines and tubes of the tail are entirely white; the spines

are also so long as to reach the insertion of the tail. The ears are much less rounded, and the nails shorter and stronger. We have compared skulls of the common Indian and African porcupines together, in the Paris Museum, and other bones of the skeleton, and we perceived a marked difference in many details. To the Indian species or variety Col. Sykes has given the title *H. Leucurus*; it is very abundant, and good eating. Like the African porcupine, when alarmed or irritated it shakes the tubes and spines of its tail violently, producing a startling noise. It stamps also with great energy, and when it assails an adversary it runs obliquely backwards, transfixing the foe with its spines. (See 'Cat. Mamm. of Dukhun,' p. 10, and 'Zool. Proceeds.' 1831, p. 103.)

Family—CHINCHILLIDÆ.

To the animals of this family, of which the beautiful chinchilla is the type, the attention of English naturalists was first called by Mr. Bennett, whose admirable paper on the subject will be found in the first volume of the 'Trans. Zool. Soc.' In this paper three genera are clearly and fully characterized, viz.: *Lagotis*, Benn.; *Chinchilla*, Benn.; and *Lagostomus*, Brookes. The *Chinchillidæ* are all peculiar to South America, and are burrowing and gregarious in their habits. Their food is exclusively vegetable. The molar teeth are $\frac{4-4}{4-4}$ destitute of true roots.

The Chinchilla (*Chinchilla lanigera*).

The characters of the genus Chinchilla, as established by Mr. Bennett, are as follows:—Molars, $\frac{4-4}{4-4}$, crossed obliquely on their surface by three lines of enamel. Toes, on the fore-feet, five; on the hind-feet, four. Tail of moderate length, and hairy; ears broad, rounded,

and nearly naked; eyes large and full; fur long, thick, close, soft, and woolly.

The chinchilla appears to have attracted in very early times the notice of travellers, though the accounts scattered in their works have been but little regarded by naturalists. In 1824 Schmidtmeyer, in his travels over the Andes into Chile, notices the chinchilla as a "woolly field-mouse which lives underground, and chiefly feeds on wild onions. Its fine fur is well known in Europe; that which comes from Upper Peru is rougher and larger than the chinchilla of Chile, but not always so beautiful

76.—Chinchilla.

in its colour. Great numbers of these animals are caught in the neighbourhood of Coquimbo and Copiapo, generally by boys with dogs, and sold to traders, who bring them to Santiago and Valparaiso, from whence they are exported. The Peruvian skins are either brought to Buenos Ayres from the eastern parts of the Andes or sent to Lima. The extensive use of this fur has lately

77.—Chinchilla.

occasioned a very considerable destruction of the animals." From this passage it would appear that there are two or more species of chinchilla, respectively Chilian and Peruvian, and hence we suspect is to be accounted for the difference in the colour and quality of the chinchilla fur which we have frequently observed. Our examination of specimens in the Paris Museum also leads us to the same conclusion. (Figs. 76 and 77.)

A native of the valleys in the high mountain districts of South America, where the cold is often very severe, the deep woolly coat of the chinchilla is well calculated for preserving warmth. Whether in the winter season the animal hybernates or not yet remains to be discovered. Of its manners, indeed, we know little. In captivity it is quiet, inoffensive, and cleanly: it feeds sitting up on its haunches like a squirrel, holding its food between its fore-paws. Its ratio of intelligence is on the same par

78. - Skeleton of Chinchilla.

with that of the rabbit or guinea-pig: hence it displays no indications of attachment to those who feed it, nor much animation or playfulness. In its alpine valleys it associates in numbers, excavating burrows, in which it resides. The female breeds twice a year, producing from four to six young at a birth. Various roots, especially those of bulbous plants, constitute the diet of the chinchilla. The colour of the fur of this species is clear gray above, but varying in depth, and passing into white on the under parts: its quality is exquisitely fine, and its length renders it well adapted for spinning. Indeed, Molina informs us that "the ancient Peruvians, who were far more industrious than the modern, made of this

79.—Skull of Chinchilla.

wool coverlets for beds, and valuable stuffs." The tail is covered with long bushy hairs, and usually kept turned up towards the back. In length the chinchilla measures about nine inches, exclusive of the tail, which is five inches. The fore-limbs are comparatively short: the head has much resemblance to that of a young, full-haired rabbit; the muzzle is short and blunt, and furnished with long whiskers; the eyes are black; the ears are ample. The skull is remarkable for the size of the antorbital foramen and the amplitude of the tympanic bulla. The general skeleton is slightly built, and the bones are slender; the ribs are thirteen on each side. Fig. 78 represents the skeleton of the *Chinchilla*

Lanigera; and Fig. 79 the skull: *a*, skull seen from above; *b*, the same seen from below; *c*, the lower jaw.

Cuvier's Lagotis (*Lagotis Cuvieri*).

Of the genus *Lagotis* two species were described and figured by Mr. Bennett (see the 'Trans. Zool. Soc.,' vol. i.). In this genus the toes of the anterior as well as posterior feet are four. The hind-limbs are considerably developed; the muzzle is somewhat elongated and narrow, and furnished with long whiskers; the eyes are moderate, but prominent; the ears are elongated, rounded at the tip, and rolled inwards at the edges. The fur is soft, long, and downy, and but loosely attached to the skin. The tail of tolerable length, and bushy, with long, stiff, wiry hairs. General contour rabbit-like. (Fig. 80.)

M. Desmarest was the first to suggest that a viscacha observed by Feuillée in Peru, and, as he says, often domesticated in the houses at Lima, was a distinct species from the viscacha of the Pampas; and a careful examination of the scattered notices published by travellers respecting the viscachas of the eastern and western sides of the Andes led Mr. Bennett to form the same opinion, which was confirmed by the acquisition of a living animal regarded as the Peruvian viscacha of the older writers. The references to the Peruvian viscacha by various of the early travellers in South America are by no means limited, and in collating them Mr. Bennett evinced a spirit of laborious research. He refers to Pedro de Cieça, 1554; Acosta, 1590; Garcilago de la Vega, 1609; Nieremberg, 1635; Feuillée, 1725; and Antonio de Ulloa, 1772. The last writer, in his 'Noticias Americanas,' gives a correct account of the habits and manners of the animal in question. Mr. Bennett's translation is as follows:—"Taking the place of the rabbit, which is wanting in Peru, there is another kind of animal, called viscacha, which is not found in Quito. In form and in the colour of the fur it is similar

80.—Cuvier's Lagotis.

to the rabbit, but differs from it in having a long tail furnished with tufted hair, which is very thin towards the root, but thick and long as it approaches the tip. It does not carry its tail turned over the head like the squirrel, but stretched out, as it were, in a horizontal direction: its joints are slender and scaly. These animals conceal themselves in holes of the rocks, in which they make their retreats, not forming burrows in the earth like rabbits. There they congregate in considerable numbers, and are mostly seen in a sitting posture, but not eating: they feed on the herbs and shrubs that grow among the rocks, and are very active. Their means of escape do not consist in the velocity of their flight, but in the promptitude with which they run to the shelter of their holes. This they commonly do when wounded; for which reason the mode of killing them is by shooting them in the head; as, if they receive the charge in any other part, although much injured, they do not fail to go and die in the interior of their burrows. They have this peculiarity, that as soon as they die their hair falls off; and on this account, although it is softer, and somewhat longer and finer, than that of the rabbit, the skin cannot be made use of for common purposes. The flesh is white, but not well flavoured, being especially distasteful at certain seasons, when it is altogether repugnant to the palate." Molina speaks of the employment of its wool among the ancient Peruvians, adding, that the Chilians of the present day (his work was originally published in 1782, and reprinted with additions in 1810) use it in the manufacture of hats.

The general colour of the viscacha of the western acclivities of the Peruvian Andes, or Cuvier's lagotis (*L. Cuvieri*), is grayish ash, clouded here and there with a tint of brown. The hairs of the tail are mingled black and white. The ears equal the head in length. The body measures sixten inches, including the head; the tail, about twelve inches. Fig. 81 represents the skeleton, and Fig. 82 the skull of the *Lagotis Cuvieri*: *a*, skull seen from above; *b*, the same seen from below; *c*,

81.- Skeleton of Cuvier's Lagotis.

lower jaw; *d*, crown of the two anterior molar teeth of the lower jaw, enlarged; *e*, crowns of the two posterior molar teeth of the upper jaw, enlarged.

82.—Skull of Cuvier's Lagotis.

The Viscacha or Biscacha of the Pampas

(*Lagostomus trychodactylus*, Brookes; *the Marmot Diana* of Griffith).

Generic characters:—the molars consist of two oblique lamellæ, excepting the posterior one in the upper jaw, which consists of three; anterior feet with only four toes, hinder feet with only three; tail moderate. Of this genus (*Lagostomus*) we know but one species, of which the earliest notice to be found is in Dobrizhoffer's 'Historia de Abiponibus,' 1784. He informs us that it is called by these people Nehelaterek, and that it resembles a hare with the tail of a fox. (Fig. 83.) "It digs its burrows on the more elevated parts of the plains with so much art, that no aperture is left by which the rain can penetrate, and these burrows are divided into distinct settlements, numerous families inhabiting the same locality. On the surface of the ground are several entrances into the burrow, at which, towards sunset, the animals may be seen seated in crowds, diligently listening for the sound of any person approaching. If everything remains quiet, they venture forth by moonlight to feed; and commit sad havoc on the neighbouring fields,

83.—Viscacha.

for they devour both European wheat and Indian corn with great avidity, despising grass when either is to be obtained. Hence the stations of the biscachas are seldom to be met with in the desert plains, but indicate with certainty the proximity of Spanish settlements; and it has often been a matter of surprise to me that I have never seen the biscacha in the territories (though well covered with crops of all kinds) either of the Abipones or the Guaranis. They are in the habit of heaping up at the entrances of their burrow dry bones, chips of wood, and refuse articles of every sort which fall in their way. The purpose, however, for which these things are collected is beyond conjecture. The Spanish colonists occasionally spend an idle hour in hunting them;

they pour buckets of water into the subterranean retreats of the creatures, which to avoid being drowned issue forth into the plain, where, without any means of escape, they are killed with sticks. Their flesh, unless they are very old, is not considered despicable even by the Spaniards." In 1789 the Abbé Jolis wrote a work, which, however, appears not to have been completed, entitled 'An Essay on the Natural History of Granchaco' (Saggio sulla Storia Naturale della Provincia del Granchaco), and in this he gives, from long observation, a description of the Pampas biscacha, which differs in some particulars from that of Dobrizhoffer. "They resemble," he says, "our hares, but have the body somewhat more arched. They live in society, in burrows underground, which they form for themselves, excavating in all directions to the extent of a mile in circumference, with various exits and separate retreats, in which the old live distinct from the young. The soil in which these are usually made is that which is hard and barren, and destitute of everything, but with bushes (*boscaglie*) at no great distance, and pasture of tender grass, roots, and the bark of trees. They collect around their retreats bones, dried leaves, and whatever they find in the neighbourhood; if anything is missing in their districts, it is to be found with certainty piled up in these situations the following day. As they are animals that avoid the light, having little power of vision, they are not to be seen in the daytime, unless at dawn, or towards evening after sunset. The night, and especially when the moon shines, is the proper time for seeking their food. Fierce and courageous, they defend themselves with all their might against the dogs, and sometimes even attack the legs of the hunters."

But neither of those authors mentions the somewhat anomalous companions with which the biscachas are associated; and we select, from the travels of Proctor, Head, Miers, and Haigh, the account of the first-named traveller, which, as Mr. Bennett observes, gives nearly all the particulars which are to be found in the rest. "The whole country from Buenos Ayres to San Luis de

la Punta is more or less burrowed by an animal between a rabbit and a badger, called the biscacho, which renders travelling dangerous, particularly by night, their holes being so large and deep that a horse is almost sure to fall if he steps into one of them. The biscacho never ventures far from its retreat, and is seldom seen till the evening, when it comes out to feed, and hundreds may be observed sporting round their holes, and making a noise very similar to the grunting of pigs. Their flesh is much liked by the people, and they are remarkably fat, and on that account, when caught at any distance from their holes, are easily run down; they will, however, defend themselves from a dog a considerable time. The holes of these animals are also inhabited by vast numbers of small owls, which sit, during the day, gazing at the passing travellers, and making a very ludicrous appearance. The parts of the road most frequented by the biscacho are generally overrun by a species of small wild melon, bitter to the taste; whether it thrives particularly on the manure of the animal, or whether the biscacho chooses its hole near this running plant, does not seem to have been ascertained."

The viscacha of the Pampas of Buenos Ayres and Paraguay is, when fully grown, as large as our common badger. Above it is of a blackish gray, beneath white. The head is large and obtuse, and a whitish band beginning on the nose passes across the face beneath each eye to the root of the ear, producing a sort of crescent-shaped mask when the face is viewed in front. The sides of the lips are furnished with a tuft of thickly-set whiskers, composed of long black bristles; and from the angles of the mouth across the cheeks, below the white band, extends a brush of black bristles, stouter than those of the whiskers, but shorter, the lowermost being sharply pointed. This brush reaches the angle of the jaw, forming a beard: it does not, however, end here abruptly, but may be traced by bristly hairs intermingled with the fur across the shoulders as far as the middle of the back. The ears are moderate and rounded; the fore-legs are rather slender and short; the hind-legs are long, and the

84.—Skeleton and Skull of Viscacha.

metatarsal portion reminds one of the same part in the limb of the kangaroo, though it is not so disproportionally elongated. At the heel there is a long naked callous sole or pad, before which is a part covered with hair: the toes are three in number, of which the middle is the most elongated: all are furnished with strong hoof-like nails, and with naked pads beneath. The tail is rather short, and covered with grayish brown hairs, of which the longest form a fringe on the upper surface; it is generally kept retroverted on the back. The incisor teeth are remarkably large and strong. Fig. 84 represents the skeleton and skull of the Pampas viscacha: *a*, under view of skull; *b*, lower jaw; *c*, crown of the second molar tooth of the left side of the lower jaw; *d*, crown of the last molar tooth of the right side of the upper jaw.

Mr. Brookes's paper on the anatomy of this animal was read before the Linn. Soc. in June, 1828, and published in the Linn. Trans. for the year following.

Family—DASYPROCTIDÆ.

A small family of the *Histricine* section, which may be termed *Dasyproctidæ*, next claims our notice. It embraces two genera, *Cœlogenys* and *Dasyprocta*. In these genera the molars are $\frac{4-4}{4-4}$, rooted, and bear much resemblance to those of the porcupines; they are crowned with distinct tubercles, which, wearing down with use, give place to winding lines of enamel, set in the interior bony cement.

The genus *Cœlogenys* includes two, or perhaps three, distinct species of Rodents, termed Pacas (a corruption of the word Pag of the Brazilians, or Paig of the natives of Paraguay; and Pakiri of some of the tribes of Guiana).

These animals, the pacas, are remarkable for a curious structural peculiarity in the skull, which imparts a singular aspect to their physiognomy. We give a sketch of

the skull of the fulvous paca (*Cœlogenys fulvus*), in profile (Fig. 85), and as viewed on its palatal aspect (Fig. 86). The peculiarity in question is the immense development of the zygomatic arch, forming an expansive shield of bone, almost concealing the lower jaw, rough and convex externally, and deeply concave within. This broad projecting convex plate has its concavity lined by a continuation or reduplicature of the skin of the face, constituting a sort of pouch, with a narrow linear opening just below the angle of the mouth, and having its edges, from which the pouch leads directly upwards, almost if not quite destitute of hair.

85.—Skull of Paca.

Notwithstanding this narrow orifice, the sac or pouch is so closed, that it cannot be serviceable as the receptacle for food, for neither is the orifice dilatable, nor the pouch, enclosed as the latter is within walls of unyielding bone. The use of this sac is not ascertained: perhaps a secretion of some kind may take place from the subzygo-

86.—Upper Jaw of Paca.

matic fold of skin, but this remains to be determined. Besides the sac described, the pacas have true cheek-pouches of considerable extent, opening from the mouth, and extending down the sides of the neck and below the inferior margin of the zygomatic shield.

The lower jaw, which is almost concealed, is shown at Fig. 87. The characters of the molar teeth, worn by use, are well depicted. Fig. 88 represents the germ of the first molar, before the tooth is completely developed, in three views, namely, the outer aspect, the inner aspect, and the crown with its tubercles. The pacas are animals of considerable size, and of a heavy clumsy figure, having

a thick muzzle, with the upper lip deeply cleft; a large inelegant head; prominent eyes, rounded ears, and stout limbs, of which the hinder pair exceed in length the anterior—but as the greater portion of the tarsus rests habitually on the ground, the body sinks even lower at the haunches than at the shoulders. The fore-feet are divided into five toes, of which the innermost is a mere

87.—Lower Jaw of Paca.

88.—Tooth of Paca.

rudiment, seated high, and furnished with a small claw. The hind-feet have also five toes, but of these the outermost on each side is small, and seated high: the three central are large, strong, and furnished with powerful hoof-like nails. The tail is wanting. The body is clothed with short, stiff, wiry hairs.

The Dusky Paca.

This species, according to Cuvier, is identical with the fulvous paca; but we have examined the skulls, and find them different. In the dusky paca the bones of the skull are smooth, and the zygomatic arches less inordinately developed. The general colour of the dusky paca is brownish black, with four lateral rows of white spots, which begin on the shoulders and terminate on the buttocks. The lowest line is almost confounded with the white of the under surface. The sides of the lower jaw, the throat, and chest are also white. Total length of head and body, about two feet; average height fourteen

89.—Dusky Paca.

inches. (Fig. 89.) These animals are natives of the whole of the eastern portion of South America, from Surinam to Paraguay, and formerly existed also in some of the islands of the West Indies. Forests in the vicinity of water; wooded, marshy places; and borders of rivers, are their favourite localities: they inhabit burrows,

which they excavate, but so superficially, that they are apt to give way beneath the foot of a person passing over them, no less to his annoyance than that of the animal, which thus suddenly finds itself in open daylight. These burrows have, as it is asserted, three openings, which the animal conceals with dry leaves and branches. In order to capture the paca alive, the hunter stops two of these apertures, and proceeds to work at the third, till he arrives at the chamber to which the avenues lead. Driven to an extremity, the paca makes a desperate resistance, often inflicting very severe wounds.

When not disturbed, the paca often sits up and washes its head and whiskers with its two fore-paws, which it licks and moistens with its saliva at each ablution, like a cat; and with these fore-paws, as well as with the hind ones, it often scratches itself and dresses its fur. Though heavy and corpulent, it can run with a good deal of activity, and often takes lively jumps. It swims and dives with great adroitness, and its cry resembles the grunting of a young pig. Its food consists of fruits and tender plants, which it seeks in the night, hardly ever quitting its burrow in the day, the strong light of which, as is the case with other nocturnal animals, is oppressive to its eye: the planter often rues the visits made by these midnight foragers to his sugar-canes. The female is said to bring forth at the rainy season, and to produce but a single young one, which stays a long time with the mother. The pacas are very cleanly creatures in all their habits, and keep their subterranean dwelling in a state of the utmost purity.

It appears that these animals root in the ground with their nose—a circumstance which, taken in conjunction with their voice, a pig-like grunt, the bristly character of their hair, and the flavour of their flesh, probably gave rise, as Mr. Bennett observes, to the comparisons made by the older writers between them and the tenant of the sty. Those which we have seen in captivity were gentle, but certainly not intelligent; and so far we agree with M. F. Cuvier, who observes that, when the animal is offended, it throws itself violently at the object which

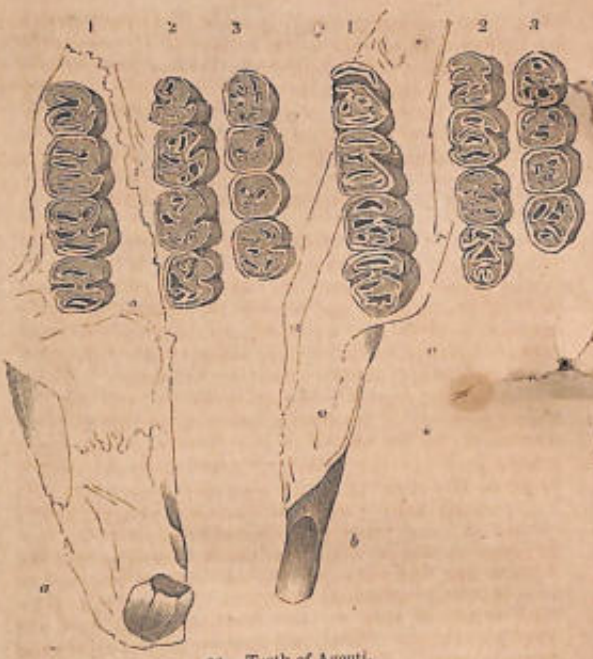
has displeased it, and then makes a kind of grumbling, which at length breaks out into a sort of bark. The greater part of the day it passes in repose, delighting in a soft bed, which it forms of straw, hay, and similar materials, collecting the materials with its mouth, and making a little heap, in the centre of which it lies down. M. Buffon gives a detailed account of one of these animals, which he kept alive in his house for some time, and which was gentle and very familiar.

The flesh of these animals is in great estimation and in some districts is in ordinary consumption, but as it is fat and rich it is apt to cloy. It is prepared for cooking by being scalded like a sucking-pig and roasted. The fur is of no value, but the skin might be useful if converted into leather. M. F. Cuvier thinks that it would be possible to introduce this animal into our European rural establishments, and that once naturalised it would form no despicable acquisition in the department of domestic economy.

THE AGOUTIS

(*Dasyprocta*, Illig.; *Chlormys*, F. Cuv.).

These animals differ from the pacas in the formation of the skull and the conformation of the feet and toes. With respect to the former, the zygomatic arch presents nothing of that strange development so remarkable in the pacas. The toes are distinctly four on each of the anterior feet: of these the outermost toe on each side is small and seated high, while the two middle are long, and armed with stout claws. The hind-feet are divided into three toes, furnished with claws of a hoof-like character, and of considerable strength. The limbs are slender, and the hinder pair considerably exceed in length the anterior: hence the pace of these animals is tolerably rapid for a short distance, though they seldom trust to speed for safety, but seek shelter and security in the first hollow tree they meet with, or under a rock. Here they allow themselves to be captured without offering any resistance, only uttering a sharp plaintive note of



90.—Teeth of Agouti.

alarm. The head of the agoutis is large, the forehead convex, the nose swollen; the ears round, short, and nearly naked; the eyes large and black; the tail is very short, generally indeed a mere tubercle. The hair is glossy and of a wiry character, and annulated in different degrees with black, yellow, or white, and olive green.

The molars are $\frac{4-4}{4-4}$, nearly all of the same size, and

when worn presenting winding folds of enamel on the flat crowns. It is impossible to convey by mere description an idea of the figures which these convolutions assume, and which vary in proportion to the wearing down of the tooth: we therefore refer to Fig. 90, where *a* and *b* represent respectively the upper and lower jaws. No. 1 represents the teeth when much worn down; 2, the same in an intermediate state; 3, the same when the tubercles are just effaced, and the surface smoothed down to a level.

The flesh of the agoutis is in some districts highly esteemed, being white and tender.

The agoutis use the fore-paws as hands to convey their food to the mouth, and usually sit upright on their haunches to eat: they frequently also assume the same position in order to look around them, or when they are surprised by any unusual sound or occurrence. Their food is exclusively of a vegetable nature, and consists most commonly of wild yams, potatoes, and other tuberous roots; in the islands of the different West India groups they are particularly destructive to the sugar-cane, of the roots of which they are extremely fond. The planters employ every artifice for destroying them, so that at present they have become comparatively rare in the sugar islands, though on the first settlement of the Antilles and Bahamas they are said to have swarmed in such countless multitudes as to have constituted the principal article of food for the Indians. They were the largest quadrupeds indigenous in these islands upon their first discovery. The same rule of geographical distribution holds good generally in other cases, viz. that, where groups of islands are detached at some distance from the mainland of a particular continent, the smaller species of animals are usually found spread over both, whilst the larger and more bulky are confined to the mainland alone, and are never found to be indigenous in the small insulated lands.

Though the agoutis use the fore-paws as described, yet they are incapable of climbing trees; and though the nails are strong, they do not burrow, but conceal

themselves in hollow trees, among fallen logs and timber in the forest, and similar places of concealment. Here they produce and rear their young, which are born with the eyes closed: they soon become capable of shifting for themselves.

The Common Agouti (*Dasyprocta acuti*).

This species is very abundant in Brazil and Guiana, and occurs also in Paraguay, where it was observed by D'Azara, who informs us that the Guarinis term it Cotia: in size it is about equal to a rabbit, but it rarely if ever makes a burrow. It frequents densely-wooded districts in preference to open lands, and generally takes up its residence in the hollow trunks of decayed trees, where it remains concealed during the day. This retreat usually serves for several individuals, for it appears to be gregarious, associating in small troops consisting of eighteen or twenty individuals. Its movements are rapid, active, and abrupt, and when chased it bounds along, like a hare, to gain its accustomed hiding-place: it is, however, seldom seen except during the night, or as evening begins to sink into twilight. (Fig. 91.)

In Brazil and Guiana the agouti is exposed to wholesale destruction for the sake of its flesh, which is said to be intermediate in flavour between the hare and rabbit; but in Paraguay, according to D'Azara, no one eats it, and M. Moreau St. Méry observes that it has a strange sort of flavour, and is a dish of little relish to the palate. The latter writer also informs us that the agouti is common in the island of St. Lucia, and also inhabits others of the West India group; and that in 1788 several were taken in St. Domingo, which had made a hollow tree their domicile. It is said to breed several times in a year, and to produce from three to six at a birth. The general colour of the agouti is grizzled reddish brown, tinged on the neck, chest, and under surface with yellow. The hairs of the upper and fore parts of the body are annulated with brown, yellow, and black, which gives the animal a speckled yellow and green appearance on

91.—Common Agouti.

the neck, head, back, and sides: on the croup, however, they are of a uniform golden yellow, much longer than on any other part of the body, and directed backwards, concealing the tail, which is a mere naked stump; the moustaches and feet black. The general length of the hair on the upper and anterior parts of the body is about an inch, that of the croup is upwards of four inches long, and all, excepting the short coarse fur of the legs and feet, and that on the breast and belly, is of a stiff, harsh nature, partaking more of the quality of bristles than of simple hair.

The golden agouti differs from the common species principally in its brighter colouring.

The Black Agouti (*Dasyprocta cristata*).

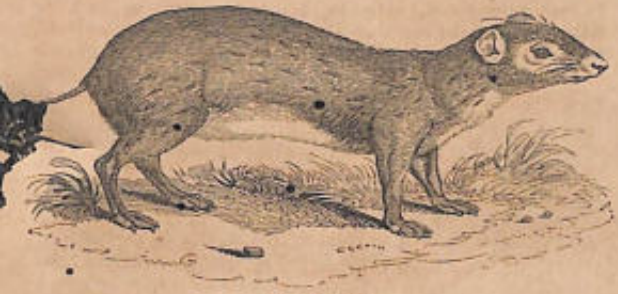
This species, to which the term crested (*cristata*) is ill applied (since the hairs of the head and neck are not longer than those of the shoulders), is smaller than the common species, but its general proportions and form are the same: it differs, however, in colour, for the hairs of the back and sides, instead of being annulated with various tints, as in that animal, are nearly of a uniform black, whilst the long hairs of the croup are perfectly so. A specimen we regarded as the black agouti, in the Paris Museum, might be thus described:—black, beautifully freckled with pure white, especially about the cheeks and sides, each hair on those parts being once ringed with white; length twenty inches. (Fig. 92.)

92.—Black Agouti.

The Acouchi (*Dasyprocta acuchi*).

This animal differs from the agouti in being of a much smaller size, lighter make, and deeper colour, and especially in having a much longer tail, this appendage measuring two inches: it is very slender, being not much thicker than a crow-quill, and covered with short scattered

hairs. (Fig. 93.) Its manners resemble those of the agouti, and it also inhabits the woods of Guiana, but is not by any means so common as that animal. M. D'Azara was mistaken in asserting the acouchi to be identical with the agouti; and it is very obvious that he never saw the former, for, if he had, the distinction could not have escaped his notice; indeed it does not appear to be a native of Paraguay. Specimens of the acouchi, as well as its skeleton, are in the museum of the Zool. Soc.



93.—Acouchi.

Two living individuals (now the museum specimens alluded to) were described in the 'Proceeds. Zool. Soc.' 1830, by T. Bell, Esq., who obtained them from Guiana. "Both individuals," he observes, "are mild and gentle in their dispositions, but somewhat timid: they are, however, familiar with their master, and run to him whenever he enters the room in which they are kept, and about which they are allowed to range during the day. Their food is entirely vegetable; they are especially partial to nuts and almonds; they drink but very little. They are extremely cleanly, and take great pains to keep their fur in order, in cleansing which they mutually assist each other. They leap occasionally in play to a considerable height, and frequently, in springing from the

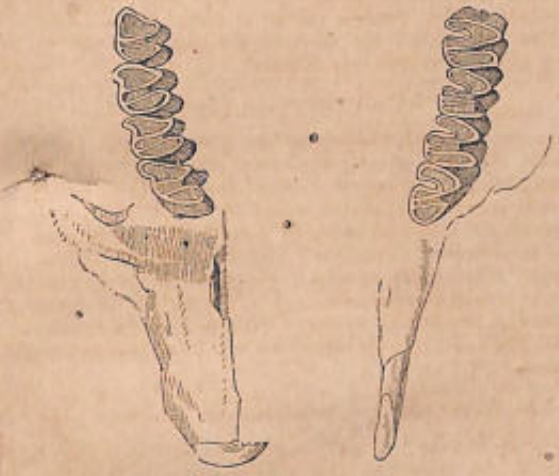
ground to an elevation of two feet, descend on the spot from which they rose. Their voice is a short, rather sharp, plaintive pur. The individuals, male and female, show great attachment to each other. They frequently agitate their tails with a quick tremulous motion." Mr. Bell observes that he had never before the arrival of these individuals seen a specimen of the acouchi, nor was he aware of the existence of even a preserved skin in any English collection. It is the Olive Cavy of Pennant. The general colour is olive mixed with yellow and black: the hairs of the croup are not so long as in the agoutis, and black.

THE CAVIES (Fam. *Caviidæ*)

Constitute a group (embracing the genera *Cavia*, *Dolichotis*, *Kerodon*, and *Hydrochærus*) which is one of the most distinctly marked in the class Rodentia, and which should not be confounded with that of the pacas and agoutis, the difference being very great, both as respects the conformation of the skull and the characters of the teeth. The molars, as seen in the teeth of the guinea-pig or aperea (*Cavia cobaia*), Fig. 94, and of the *kerodon*, Fig. 95, may be compared with those of the agouti, Fig. 90, and the wide distinction will be at once appreciated

The molars are $\frac{4-4}{4-4}$, lamellose, and composite; the folds of enamel enclose triangular or cordiform interspaces. A projecting ridge always occurs on the outer side of the ramus of the lower jaw. In the genus *Cavia* the anterior feet have four toes, the posterior three; the nails are short and robust; there is no tail. As an example of this genus we may take the common guinea-pig, or aperea, the domestic descendant of a species still common in a wild state in various parts of South America. Mr. Darwin, who met with the wild aperea abundantly, states it to be "exceedingly common in the neighbourhood of the several towns which stand on the banks of the Rio Plata. It frequents different kinds of stations,

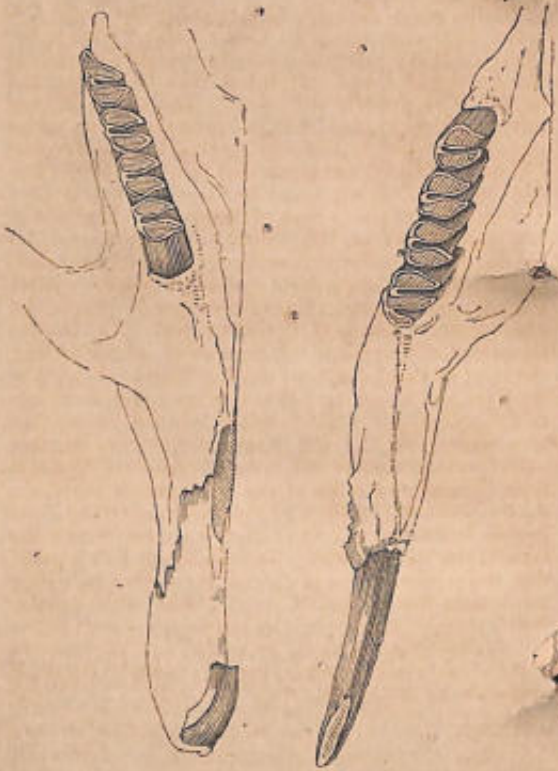
such as hedgerows made of the agave and opuntia, or sand hillocks; and again marshy places covered with aquatic plants, the latter appearing to be its favourite haunt. Where the soil is dry it makes a burrow, but where otherwise it lives concealed amidst the herbage. These animals generally come out to feed in the evening, and are then tame; but if the day be gloomy they make their appearance in the morning. They are said to be



94.—Teeth of Guinea-pig.

very injurious to young trees. An old male killed at Maldonado weighed 1 lb. 3 oz." Mr. Darwin observed that in this animal the attachment of the fur to the skin is very slight. Possessing but little intelligence and very timid, the aperea is nevertheless tamed without any difficulty. Azara, who kept one, remarks that, though he took no pains to make it familiar, it manifested no fear when in his presence, and seemed quite unconcerned.

It is to this ease with which the wild aperea becomes domesticated that we owe the introduction of it into Europe, for, excepting that it is a very pretty creature, there is nothing to render it a valuable acquisition. It



93.—Teeth of Kerodon.

is however eaten by the native tribes of Paraguay, who sometimes capture it by hundreds when, driven from the lowlands by sudden inundations, it retreats for safety to the adjacent hilly grounds, where it finds neither shelter nor concealment.

Of the genus *Kerodon* we may notice the Rock Kerodon (*Kerodon moco*, F. Cuv.; *Cavia rupestris*, Pr. Max.). It is a native of the rocky mountain districts in the interior of Brazil. It is less than the aperea, and its fur is very thick and short. The colour is gray mixed with black, and reddish-brown above, the under parts being white. A second species, King's Kerodon (*Kerodon Kingii*), was introduced to science by the late Mr. Bennett. It was found by Captain King at Port Desire, on the eastern coast of Patagonia. In size it is less than the aperea, being about nine inches long. Its colour is more uniform than that of the rocky kerodon, and of a deeper tint; a slight dash of white is perceptible behind each ear, and a line of the same tint marks the edge of each branch of the lower jaw. Mr. Darwin states that this kerodon "is common at intervals along the coast of Patagonia, from the Rio Negro (lat. 41°) to the Straits of Magellan. It is very tame, and commonly feeds by day. It is said to bring forth two young ones at a birth. At the Rio Negro it frequents in great numbers the bottom of old hedges. At Port Desire it lives beneath the ruins of the old Spanish Buildings. At the Strait of Magellan I have seen amongst the Patagonian Indians cloaks for small children made with the skins of this little animal. And the Jesuit Falkner says that the people of one of the southern tribes take their name from the number of these animals which inhabit their country. The Spaniards and half-civilized Indians call the kerodon 'conejos,' or rabbit, and thus has the mistake arisen that rabbits are found in the neighbourhood of the Straits of Magellan."

The Patagonian Cavy, or Mara

(*Dolichotis Patachonica*, Desm.; *Cavia Patachonica*, Shaw).

This large cavy is rare in European museums. A fine specimen, however, is preserved in the British Museum and the Museum of the Zoological Society. It is a beautiful animal, standing high on the legs, with much of the port of some of the bush antelopes of Africa. Its height at the shoulder is about a foot and a half. Its length is about two feet six inches, including the tail, which is nearly two inches long. (Fig. 96.) It lives

96.—Patagonian Cavy.

on the Pampas south of Buenos Ayres, and especially in Patagonia. It is noticed by Narborough, Wood, and Byron as being very abundant at Port Desire, and also at Port St. Julian, where, however, it does not now appear to exist. It is only where the country has a desert character that this species is common; and in the wilds of Patagonia little groups of two, three, or four may be continually seen hopping after each other in a straight

line, over plains of gravel thinly clothed with a few thorny dreary bushes and a withered herbage.

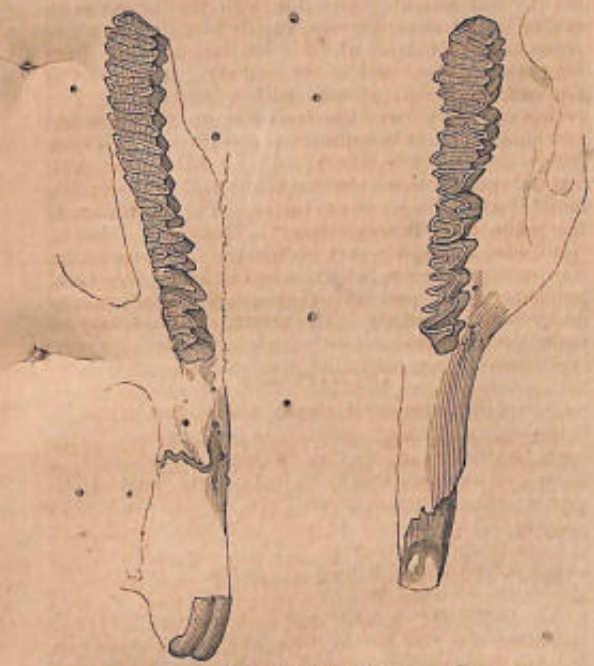
According to Azara, this cavy does not range higher north than latitude 35°: but in this statement he appears to be mistaken, for Mr. Darwin observed that near the coast of the Atlantic its northern limit is formed by the Sierra Tapalguen, in latitude 37° 30′, where the plains rather suddenly become greener and more humid; and he remarks that its limit there certainly depends on this change, since near Mendoza, 33° 30′, four degrees farther northward, where the country is very sterile, this animal again occurs. Azara states that this cavy never excavates its own burrow, but always uses that of the viscacha or biscacha; and Mr. Darwin considers that where that animal is present Azara's statement is doubtless correct, but that on the sandy plains of Bahia Blanca, where the biscacha is not found, this cavy, as the Spaniards maintain, is its own workman. The same thing, he adds, occurs with the little owls of the Pampas (*noctua cunicularia*), which have been described by travellers as standing like sentinels at the mouth of almost every burrow; for in Banda Oriental, owing to the absence of the biscacha, these birds are obliged to hollow out their own habitations. Azara moreover states that, except when pressed by danger, this cavy does not have recourse to its burrow for safety, but crouches on the plains, or trusts to its speed; adding, however, that it is soon run down. On the contrary, Mr. Darwin asserts that at Bahia Blanca he repeatedly saw two or three animals sitting on their haunches by the mouths of their holes, which they quietly entered as he passed by at a distance. He remarks, however, that, different from most burrowing animals, they wander, commonly two or three together, to miles or even leagues from their home, and he was not able to ascertain whether or not they returned at night. This species is diurnal in its habits, roaming about by day. It is very shy and watchful, seldom squats after the manner of a hare, and cannot run fast, so that indifferent dogs easily overtake it. The female breeds in her burrow, generally producing two

young ones at a birth. The flesh of this animal is white, but dry and insipid. The skin with the fur on is in esteem, being used for rugs, and is beautiful from the character of the hair, which is full and soft, and from the tasteful arrangement of the marking. The colour of the back is brown, grizzled with white, verging into yellow on the sides of the body and on the limbs, but becoming black as it approaches the haunch: this dark hue is there abruptly interrupted by a white band passing transversely above the root of the tail, and spreading on the back and sides of the thighs. The appearance of this white mark is very striking. The chest, inside of the limbs, and under part of the body are also white. The ears are three inches and a half in length, erect and pointed. Full-grown individuals weigh between twenty and twenty-six pounds. The young, it is said, may be easily domesticated.

The Capybara

(*Hydrochærus Capybara*; *Cabiai*, Buff.).

The capybara (the only known species of the genus *Hydrochærus*) is the largest of all the Rodentia; and its size, its massive heavy proportions, its thick head, and the bristly character of its hair, give it a degree of resemblance to some of the Pachydermata. Marcgrave regards it as a sort of aquatic hog; Fermins, in his 'History of Surinam,' 1775, terms it *Porcus fluviatilis*, or river-hog; while Pennant gives it the title of thick-nosed tapir. It is also the cochon d'eau of Desmarchais; the *Sus maximus palustris* of Barrère; and the *Sus hydrochærus*. Pig-like as the capybara may be in its external aspect, it is nevertheless a genuine Rodent, as much so as the hare or agouti. Its dentition consists of the usual incisors, which are of prodigious size and strength; those in the upper jaw have a deep longitudinal furrow on their outer surface. The molars are four on each side, above and below; and consist of a series of obliquely transverse parallel laminæ of enamel (Fig. 97), presenting acute lateral projections in the first three teeth: these projections are on the outer edge



97.—Teeth of Capybara.

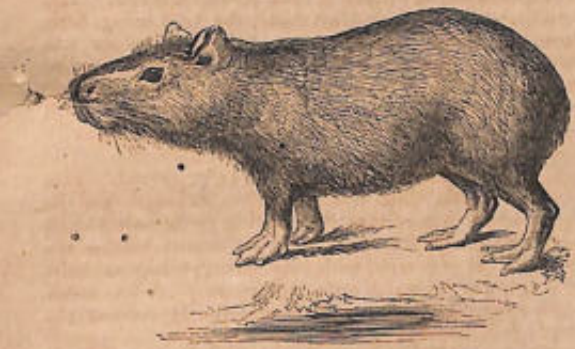
of the upper teeth and the inner edge of the lower. The spaces enclosed by the layers of enamel are filled in with osseous matter, and the whole is united into a single mass by intervening cortical matter, or *crusta petrosa*. The molars of the capybara are in fact analogous to those of the elephant.

We have stated that in some Rodents the fauces, or back of the mouth, is continued funnel-shaped, opening

into the œsophagus through a small orifice surrounded by a muscle of circular fibres, allowing only the gradual transmission of food which has been previously reduced to a thorough pulp. This structural peculiarity was first pointed out in the capybara by Mr. Morgan ('Linn. Trans.' vol. xvi.), but we meet with it also in the coypu, the capromys, and the beaver. (See 'Proc. Zool. Soc.,' 1832, p. 73; 1835, p. 175.) In the capybara the head is large, the muzzle thick and blunt, the upper lip deeply fissured; the eyes are moderately large; the ears small and rounded. The naked patch of the size of half a crown occupies the cheek a little below each eye. The fore-limbs are short and muscular, the toes being four, furnished with strong claws; the hind-limbs are also thick, but longer than those before, and the whole of the sole, which is covered with naked rough skin, is applied to the ground. The toes are three in number, having strong large hoof-like nails, and being partially connected together by intervening membranes. The tail, a mere rudiment, is scarcely to be perceived. This animal exceeds three feet six inches in length, and its body, which is more than three feet in girth, owing to its bulk and the shortness of the limbs, almost touches the ground. It is covered with long, coarse, thinly-set hairs of a sandy or brownish gray. (Fig. 98.) A fine specimen, recently living, is preserved in the Museum of the Zoological Society.

The capybara is a gregarious animal, frequenting the rich and wooded borders of the lakes and rivers in Brazil, Guiana, and Paraguay. Mr. Darwin states that it is common, wherever there are large rivers or lakes, over that part of the South American continent which lies between the Orinoco and the Plata, a distance of nearly 1400 miles. They are not generally supposed to extend south of the Plata, but he heard that there were capybaras (provincially termed *Laguna carpincho*) high up the Salado, and presumes that they have sometimes been seen south of the former river. This animal lives usually in small companies, which remain concealed among the thickets and dense herbage of the borders of

the water during the day, and wander forth at night to feed. When alarmed, the capybara utters a loud cry like the vowel sounds *a-pé*, and immediately makes for the water, into which it plunges, swimming with great ease and quickness, little more than its nose appearing above the surface. If hard pressed or wounded, it dives in order to baffle its pursuers, and then endeavours to gain a more secure place of concealment. It is eagerly hunted for the sake of its flesh, which is accounted good, though of a musky flavour: the hind quarters are made into hams. Of its natural enemies the terrible jaguar is the most for-



98.—Capybara.

midable: this powerful beast steals upon the capybara by surprise, and destroys numbers. The food of the capybara consists exclusively of grass and vegetables, as water-melons, gourds, &c. Azara does not believe that these animals ever frequent salt-water: Mr. Darwin shot one in the bay of Monte Video, an old female, measuring, from the tip of the snout to the end of the stump-like tail, three feet eight and a half inches, in girth three feet two inches, and weighing 98 lbs. Several also were seen by the officers of the Beagle on the island of Guritti,

off Maldonado, where the water is nearly as salt as in the sea.

On the banks of the Apure Humboldt saw the capybara, which he calls Chiguira, in troops of fifty or sixty. He notices the ease of the capybara in the water; and states that he saw with surprise the animals, affrighted by the approach of a boat, dive and remain from eight to ten minutes under water. On the Apure, Arauco, &c., and in the vast savannahs of the Llanos, the animal is said to be often seen in droves of a hundred. They there browse upon a sort of grass called chiguirirero.

The common posture of the capybara when at rest is sitting upon the haunches, the soles of the hind-feet being applied flat to the ground, like the agouti, the viscacha, and many others of the Rodents. The female breeds once in a year, and brings forth from four to six or seven at a birth, having prepared a snug bed of dried herbs and grasses.

Family—LEPORIDÆ.

The family *Leporidæ* contains the hares and rabbits (*Lepus*), and the pikas (*Lagomys*). This family is well marked in its characters, comprehending only two genera, of which one, the genus *Lepus*, is widely distributed, though it has the most representatives in North America, where the number of species already discovered is equal to that of all the rest found in the other portions of the globe taken together.

The Common Hare (*Lepus timidus*).

Λαγὼς (Lagos) of the Greeks; Lepus of the Latins; Lepre and Lievora of the modern Italians; Liebre and Lebratello of the Spaniards; Lebre and Lebrimho of the Portuguese; Lièvre, French; Has, Haas, and Hase of the Germans; Haas and Haze of the Danes; Hara of the Swedes; Hara of the Anglo-Saxons; Ysgyfarnog Ceinach of the Ancient British.

In the genus *Lepus*, behind the ordinary incisors of the upper jaw are two more of a much smaller size: the

molars, the small posterior one excepted, are composed of two vertical plates soldered together. Dental formula:—Incisors, $\frac{4}{2}$; molars, $\frac{6-6}{5-5}$. (Fig. 99.) The ears are long; the eyes large; the tail short and turned upwards; five toes before, four behind; feet and toes hairy beneath.

Few animals are better known than our common hare,

99.—Teeth of Common Hare.

which is spread over a great portion of Europe, and appears to be indigenous in our country; but the ancient Britons abstained from eating its flesh on religious grounds. This species probably extends into Asia. Mr. M'Clelland states that it occurs in Assam, but is of degenerate size, measuring only from seventeen to nineteen inches, instead of twenty-one. "It is not esteemed there an article of food. The ears are more uniformly gray than in the European variety" ('Proc. Zool. Soc.,' 1839). We suspect the Assam hare to be a distinct species. Timid and defenceless, and surrounded by numerous enemies, the hare is yet well endowed with the means of self-preservation. It is watchful and swift; and its brown fur assimilates in colour with the russet herbage among which it most makes its form. All are acquainted with the external characters of the hare, and with its habits, of which it is useless to give minute details.

The hare swims well, and takes fearlessly to the water. We have known them cross a broad and rapid stream; and Mr. Yarrold (see 'Loudon's Magazine,' vol. v.) gives an account of one which in the morning at high water came down to the sea-shore, and crossed over to an island a mile distant from the mainland.

Wild and timid as the hare is, it is not unsusceptible of domestication. The poet Cowper, as is well known, kept tame hares; and many other instances might be enumerated.

The hare breeds when about a year old, and produces two or three broods in the course of the spring and summer; but the males and females do not form permanent associations. The female, after about thirty days' gestation, brings forth from three to five young. These are born covered with fur, and with the eyes open; and in about a month they leave their parent and shift for themselves. The leverets, as the young are termed, are the prey of stoats, weasels, polecats, owls, and hawks.

Besides the common hare, the Alpine or varying hare inhabits certain districts of our island, namely, the northern parts of Scotland. This species (*Lepus variabilis*) is common in the mountain districts of Sweden,

Norway, Lapland, and in the Alps. It is occasionally seen on the mountains of Cumberland.

The Alpine hare is intermediate in size between the rabbit and the English hare. In Sutherlandshire and other parts of the Scottish highlands it tenants the summits of the mountains, hiding in the clefts of rocks or among rocky fragments. During the winter lichen is its staple food. At this season it descends to a lower and less exposed station; and its fur, gradually losing the light fulvous gray of summer, becomes of a snowy white, the tips of its ears (which are shorter than the head) remaining black.

The common hare of Ireland (*Lepus Hibernicus*) is again distinct from the common hare of England. The distinguishing characters between the two were first pointed out by Mr. Yarrell. (See 'Proc. Zool. Soc.' 1833, p. 88.)

Though somewhat larger than the English species, its head is shorter and more rounded, its ears still shorter than its head, and its limbs less lengthened. The fur also differs greatly in its quality from that of our common hare, and is useless as an article of trade.

* *

The Rabbit (*Lepus Cuniculus*).

Coney, Anglicè; Coneglio of the Italians; Conejo, Spanish; Coelho, Portuguese; Königlein and Kaninchen, German; Konin, Dutch; Kanin, Swedish; Kanine, Danish; and Cwningen of the Welsh.

Size excepted, the rabbit closely resembles the hare in all its principal characters. It may, however, be at once distinguished by the comparative shortness of the head and ears, as well as of the hinder limbs; the absence of a black tip to the ears; and by the brown colour of the upper surface of the tail. Its habits and general economy are totally opposite to those of the hare; and its flesh, instead of being dark and highly flavoured, is white, and, though delicate, somewhat insipid, especially that of the tame breed. The flesh of the latter is indeed

preferred by some, but we agree with M. Ude in thinking it very inferior.

It would appear that the rabbit is not an aboriginal of our island, but the date of its introduction is unknown. In the year 1309, at the installation feast of the Abbot of St. Austin's, six hundred of these animals were provided, at the then great cost of 15*l.*; the price of each, sixpence, being that of a pig. It is generally believed that the rabbit was first introduced into Spain from Africa by the Romans, whence it gradually spread, naturalising itself in temperate climates.

This animal is eminently gregarious; and, as is well known, makes extensive burrows, in which it habitually dwells and rears its young. Sandy soils, with a superficial layer of fine vegetable mould clothed with thyme, fine grass, and other herbage, which at the same time afford food and are easily mined, are favourable spots for the increase of the rabbit. They delight in steep sand-banks overhung with brushwood and furze; and we have remarked that where the old red sandstone crops out and is rendered friable, or somewhat decomposed by the action of the atmospheric elements, rabbits are very numerous, burrowing with great facility. They abound also in woods, especially such as clothe the declivities of hills, whence, like the hare, they make incursions into the adjacent corn-lands. A rabbit-warren, that is, a wide sandy heath, or extensive common, devoted to their increase and feeding, when visited at the close of day or by moonlight, affords an amusing spectacle. Hundreds may be seen of all sizes, gambolling and sporting, and chasing each other with astonishing rapidity. When alarmed, they take to their burrows, disappearing as if by magic.

The female is capable of breeding at six months old; and four or five litters, consisting each of about five young, are annually produced. We have stated that the hare produces her young clothed, capable of seeing, and soon in a condition to shift for themselves. With the rabbit circumstances are widely different. The young are born blind, and naked, and totally helpless. The

female forms a separate burrow, at the bottom of which she makes a nest of dried grass, lining it with fur taken from her own body. In this nest she deposits her young, carefully covering them over every time she leaves them. It is not until the tenth or twelfth day that the young are able to see; nor do they leave the burrow till four or five weeks old.

The wild rabbit is undoubtedly the origin of our various domestic breeds. Tame rabbits indeed easily resume their natural state of freedom, and return to their instinctive habits. Albinoes are common in a state of domestication, and it often happens that one or two appear in a litter when neither of the parents are so.

The Syrian Hare.

According to Desmarest, the common hare of Europe exists in Greece, Asia Minor, and Syria. It is, however, very probable that the Egyptian hare (*Lepus Ægyptius*) extends into the latter region. It differs from the European species principally in the greater proportionate length of its hind limbs and ears.

The Dwarf Pika (*Lagomys pusillus*).

The Calling-Hare of Pennant; Semlanoi Saetshik, or Ground Hare, of the Russians about the Volga; Tschatschat or Ittsitskan, Barking Mouse, of the Tartars; Rusla of the Calmucs.

In the genus *Lagomys* the muzzle is acute, the ears short and somewhat rounded, and the soles of the feet hairy; the tail is wanting. The dental formula approaches that of the genus *Lepus*:—Incisors, $\frac{4}{2}$; molars, $\frac{5-5}{5-5}$. The genus *Lagomys* is widely distributed, though the species described are not numerous. About five are known, and of these three are natives of the rocky deserts of Tartary and Siberia; the fourth is a native of the Himalaya Mountains; a fifth of the Rocky Moun-

tains in the high northern regions of America, from latitude 52° to 60°.

The pikas are pretty little animals, with something of the manners of our rabbits, and dwell in burrows, which are artfully concealed.

The dwarf pika, or calling-hare, measures little more than six inches in total length. It has the head longer than usual with hares, and thickly covered with fur, even to the tip of the nose; numerous hairs in the whiskers; ears large and rounded; legs very short; soles furred beneath; its whole coat very soft, long, and smooth, with a thick, long, fine down beneath, of a brownish lead-colour; the hairs of the same colour, towards the ends of a light gray, and tipped with black; the lower part of the body hoary; the sides and ends of the fur yellowish. Weight from three and a quarter to four and a half ounces; in winter scarcely two and a half ounces. (Fig. 100.)

The dwarf pika, or calling-hare, is found in the south-east parts of Russia, and about the mountain ridge

100.—Dwarf Pika.

spreading from the Ural chain to the south; it also frequents the borders of the Irtish and the west part of the Altaic chain, but occurs nowhere in the east beyond the Oby.

These animals delight in sunny valleys and the declivities of hills, where food is plentiful, and especially where woods or forests afford them a refuge in time of danger. They dig deep and intricate burrows, the openings of which are not above two inches in diameter, and are usually formed beneath the concealment of a bush, in situations abounding with thickets and underwood, and with the various shrubs and grasses upon which they feed. They lead for the most part a solitary life, sleep during the day with unclosed eyelids, like the hare, and emerge from their retreats at night, in search of food, which principally consists of the bark of the young bushes, flowers, buds, and grass. They form no winter store, but, during the inclement portion of the year, still continue to seek out, by excavating tracks beneath the snow, their accustomed fare, and they are frequently subjected to severe privations, and even death, in consequence of a deficiency of their favourite plants. They drink often when they happen to be near water, but can exist with very little. The females produce at each litter five or six young, which are born blind, helpless, and without fur; but in eight days they acquire sight, are covered with hair, and begin to enjoy the use of their limbs.

The most obvious peculiarity of these pikas is their voice, from which they have acquired their trivial name. Its tone is so like that of a quail, that it is often mistaken for it even by the inhabitants of their native districts. It is heard only in the morning and evening, except in dark and cloudy weather, and is repeated five or six times by each animal at regular intervals, and is loud and sonorous. Both the male and female utter this note, but the latter is silent for some time after she has brought forth her young, which takes place in the month of May.

The pikas are exceedingly gentle. Pallas states that

they will acquire confidence and become tame in the course of a day after captivity. They sit in a crouching posture, like the chinchilla, and are extremely cleanly, frequently rubbing their faces with their fore-paws after the manner of rabbits, and scratching their fur with their hinder claws. They run by short leaps; and sleep stretched out at full length.

ORDER EDENTATA, Cuv.

(*Bruta*, Linn.).

This order, which contains the Sloths, the extinct Megatherium and Mylodon, the Armadillo, the Pangolin, and the Ant-eater, appears at a first glance to be less natural than upon careful analysis it is proved to be. Several important links indeed, the absence of which left voids in the chain, have fortunately been recovered, their fossil relics restored, and the species assigned to their true place. In this philosophic labour Professor Owen has rendered to science the most important service, and his work, entitled 'A Description of the Skeleton of an extinct gigantic Sloth,' but which is in fact an elaborate analysis of the structure and affinities of the megatherioid quadrupeds in general, is a monument of research and acumen.

With respect to the term Edentata (toothless animals), it must be taken in a qualified sense. The ant-eaters and pangolins are indeed destitute of teeth, but the other genera possess these organs with certain limitations as to number, and of peculiar structure, wanting both the neck part and enamel. Without further preface we may observe that the Edentata resolve themselves into two great sections, namely, Leaf-eaters, and Insect or Flesh eaters. These sections, from their respective habits, have been termed by Desmarest *Tardigrada*, or slow-paced, and *Effodientia*, or diggers: but to these terms, as they are not universally applicable to the species they include, there are some objections.

Section I. LEAF-EATERS.

Family—SLOTHS

(*Tardigrada*, Owen; *Bradypolidæ*, Auct.).

Genus *Bradypus*, Linn. (*Achetus*, F. Cuv.)—Claws on the fore-feet, three.

The Common Sloth, or Aï

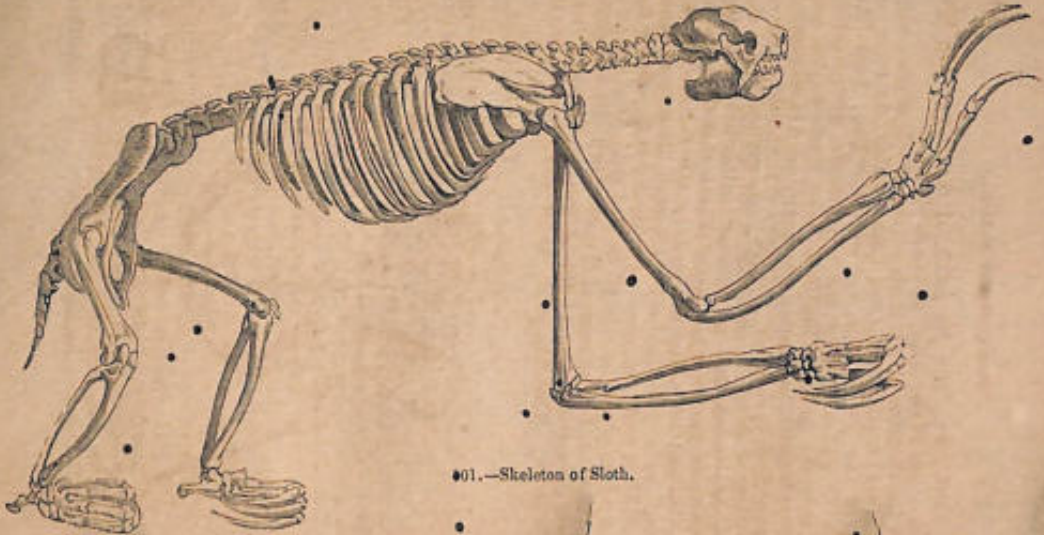
(*Bradypus tridactylus*, Linn.).

The Sloths are creatures as extraordinary in their habits as in their organization, the one having a mutual relationship to the other. They are exclusively arboreal; the trees afford them at once their needful food and their permanent abiding-place: and for the trees alone are they structurally adapted. It is not long since that the sloth was condemned as a degraded miserable being, slow and embarrassed in all its movements, and wretchedly framed, as if Nature had bungled in its creation. Inconsistent with philosophy, and presumptuous in the extreme, is such an opinion. The tall giraffe and the sinewy-limbed antelope are not more directly organized for their respective requirements than is the sloth for its appointed place in the scale of creation. Were it a terrestrial animal, then indeed might we call its structure defective; but, its mode of life taken into consideration, we view it in another light, and perceive that it affords a marked example of design and purpose.

Buffon's eloquent misrepresentation of the sloth need not detain us, but we cannot avoid expressing our surprise that the great Cuvier not only quotes the words of that naturalist, but even follows up his ideas. The only excuse is, that the habits of the animals till recently were very imperfectly understood; yet might we not expect that a philosopher would pause before concluding that in the works of nature there occurred exceptions to the laws of harmony by which the whole is governed?

A few observations on the organization of the sloth may not be unacceptable.

Fig. 101 represents the skeleton of the common three-



401.—Skeleton of Sloth.

toed sloth; Fig. 102 the pelvis of the same; Fig 103 the skeleton of the unau, or two-toed sloth.

In the skeleton of the sloth we are struck at once with the great length of the fore limbs, which are twice as long as the hinder pair, and with the huge hook-like claws by which all four are terminated: we perceive, too, that the pelvis is bird-like in its conformation and of great breadth, separating the thigh-bones to an unusual distance from each other; added to this, the thigh-bones are directed obliquely outwards, while the limb from the knee downwards has an inward inclination; and the structure of the wrist and ankle is such that the palm or sole, instead of being directed to the surface of the ground, as in other animals, is turned inwards towards the body in such a manner as to render it impossible for the sloth to place the sole of its foot straight down on a level surface, but to compel it under such circumstances to rest upon the external edge of the foot (see skeleton, Fig. 101). The hip-joint, as in the orang-outan, is

102.—Pelvis of Sloth.

103.—Skeleton of Unau.

destitute of the ligamentum teres, whence the head of the thigh-bone is endowed with greater freedom of motion. In the ai (three-toed sloth) the neck consists of nine vertebræ, instead of seven, the ordinary number in mammalia, and the two tables of the skull in all the species are separated by large air-cells, so that the small bird-like brain is defended by a double case, a provision against accidental falls, should the branch to which the animal is clinging give way.

Professor Owen observes, respecting the sloths, that "they illustrate the affinity or tendency to the oviparous type, by the supernumerary cervical vertebræ, supporting false ribs, and by the convolution of the windpipe in the thorax, in the three-toed species; by the lacertine (lizard-like) character of three-and-twenty pairs of ribs in the unau; and by the low cerebral development, by the great tenacity of life, and long-enduring irritability of muscular fibre in both species." The muscles of the

sloth, indeed, are endowed with the most astonishing energy; their force is, indeed, almost incredible, and harmonizes with the arboreal design of the skeleton, of which the limbs alone sufficiently indicate the creature's habits. Who can mistake the meaning of the solid hook-like structure of the paws, or the design of the long arms, or of the security of the union of the clavicle to the large scapula? We might here enter into minute details, but we refrain, only observing that Nature in these points aimed at rigid unyielding strength, and has obtained the result she wished; the long arms of the sloth being thus furnished with strong hooks, which are drawn to the palm (and the same observation applies to the claws of the hind-feet) by means of elastic

104.—Sloth.

105.—Sloth: mode of progression.

ligaments, it can reach to a distant branch, and there fix itself with facility, or, while clinging to one branch, can draw towards itself another loaded with buds, fruits, or leaves, which offer a grateful repast. (Fig. 104.) Rigid as its paw is, it can use it as a hand, and with great address convey food to its mouth.

Unfitted then for the ground, along which he can only drag himself by applying the claws of the fore-feet to any rough projection within reach, the sloth is eminently qualified for the branches of the forest, and that rather for their upper than their under surface; clinging to them, he rests and travels suspended, yet in perfect security; here his awkwardness disappears, and he traverses the branches or passes from tree to tree in the dense forest with considerable celerity, either in quest of food or in order to escape his enemies. Stedman, in his 'History of Surinam,' has an engraving of a sloth in this position, which we have copied as illustrating its singular mode of progression. (Fig. 105.) But the arms of the sloth are also his weapons of defence, and weapons of no little force: when attacked on the ground, he throws himself on his back, fixes his claws on his adversary, and grasps him with enormous power; in this manner he has

been known to strangle a dog, holding him all the while at arm's length; and in this manner he grapples with snakes of large size, to the attacks of which he is said to be subject.

Mr. Burchell (says Professor Buckland, in an interesting paper on these animals in the 'Linn. Trans.' 1835) observed that "his captive sloths assumed during sleep a position of perfect ease and safety on the fork of a tree, their arms embracing the trunk, their backs resting on the angle of a branch, and their head reclining on their own bosom. The animal is thus rolled up nearly in the form of a ball; the entire vertebral column, including the neck, assumes a nearly circular curve, and not only is the weight of the whole body maintained in an attitude of ease and safety, but the head is supported between the arms and chest, and the face lies buried in the long wool which covers those parts, and is thus protected during sleep from the myriads of insects which would otherwise attack it." According to Mr. Burchell, the buds and young shoots of a species of *Cecropia* form the principal food of the sloth. These trees grow only in damp places, and rise with a slender stem to the height of thirty or forty feet, giving off horizontal branches, hollow internally, except at the extremities. Along these branches it travels, and the young cling round the body of the mother. It would appear that the moisture of leaves or buds suffices the sloth for drink, as none kept by Mr. Burchell took liquid in any other way. In the aspect of the sloth there is an expression of profound melancholy; it seldom utters any cry; it notices nothing with any positive mark of attention, except perhaps the trees to which unerring instinct draws it, nor by any action evinces much intelligence.

The dental system of the sloths is the most simple that can well be conceived. They have no incisor teeth, but canines and molars only; and in the ai the canines are diminutive, and in all respects very similar to the other teeth. The molar teeth are universally eight in the upper jaw and six in the lower, four and three on either side respectively. Their construction is most

simple; they are cylindrical, unrooted, consisting, as Professor Owen has demonstrated, of a centre of vascular dentine surrounded by unvascular dentine or ivory, the whole enveloped by a layer of cœmentum, characterised by numerous minute calciferous cells. Ill fitted for grinding the food, the teeth merely bruise it or break down the tender structure of the buds or leaves, their deficiency in this point being most probably compensated by the singular complication of the stomach, which is sacculated.

The sloths bring forth and suckle their young like ordinary quadrupeds. They have two mammæ, which are situated on the breast; and the young sloth, from the moment of its birth, adheres to the body of its parent till it acquires sufficient size and strength to shift for itself. The head of the aï is short, the face small and round like that of the American monkeys, the ears concealed in the long hair which surrounds them, the eyes small and deeply sunk in the head, and the tail a mere rudiment. The Indians like its flesh, and are in continual pursuit of it.

Naturalists reckon two distinct species of the aï, and three or four varieties, some of which may probably be found to be specifically different, when they come to be dissected and carefully compared with one another. 1. The Common Aï (*Bradypus tridactylus*, Linn.) has a short round head, furnished with coarse shaggy hair, disposed on the crown in verging rays, like that of the human species; the face is of a yellowish colour, covered with very short hair, whilst that of the body and extremities is universally long and shaggy; the eyes are encircled by a brown ring; the hair of the body varied with irregular patches of dark and light brown, or silvery white: between the shoulders there is an oval patch of short orange-coloured hair, of a finer quality than that found on other parts of the body, and divided in the centre by a longitudinal black stripe; the throat and breast are frequently of a light straw-colour. The texture of the hair is altogether peculiar, and more nearly resembles dry hay, or grass shrivelled and withered by the sun,

than the hair of ordinary quadrupeds. It is coarse and flattened at the extremity, but as small at the root as the finest spider's web; and its dry and withered appearance forms the ai's principal security against its pursuers, as it renders it extremely difficult to detect it whilst at rest among the branches covered with bark and moss of the same colour; it is only when in motion that it can be readily distinguished from the trunk beneath which it hangs suspended. In other respects, different individuals of this species differ considerably from one another, in the shade and disposition of their colours, and in the intensity of the mark between the shoulders; some even want this latter mark altogether, others are of a uniform ash-colour over the whole body, and there are others still which have the hair of the head parted in the centre and hanging down upon each side.

Length of the adult about seventeen or eighteen inches.

The Collared Aï (*Bradypus collaris*) is a very distinct species, even in the bony structure of its cranium. Its face is naked and of a black colour; the hair of its body less flattened and withered-looking than in the common species; the forehead, temples, chin, throat, and breast covered with reddish or rust-coloured hair, slightly frizzled; on the crown of the head it is long and yellow, and on the rest of the body pale orange: but the most distinguishing mark of the species is a large black collar which completely surrounds the neck, and from which its specific name of *collaris* is derived. Beneath this outer coat there is an inner one of very fine fur, which is of a dark-brown colour on the collar, but gradually diminishes in intensity towards the croup, where it is entirely white.

Both these species feed upon the leaves of trees, and bring forth but a single young one at a birth. When in motion in the forests, they emit a feeble plaintive cry, resembling the word Aï, and which is the origin of the name they bear among the Europeans settled in America. They are extremely retentive of life, and have been seen to move their legs, and exhibit other symptoms of viva-

city, a full half-hour after being deprived of the heart and other viscera.

The Unau, or two-toed sloth, of which we figure the skeleton (Fig. 103), is placed by Illiger in a distinct genus, under the title of *Cholæpus*. It is the *Bradypus didactylus* of Linnæus. In its manners it closely resembles the ai, which it exceeds in size.

In both genera the skull is rounded, and the muzzle short, but more especially in the ais. The zygomatic arch is very bold and stout, but is incomplete in the centre. The malar bone is much developed, and gives off a descending branch reaching over the lower jaw, but its zygomatic process does not reach the corresponding process of the temporal bone; hence the arch, as we have said, is imperfect. The orbits are nearly circular, but incomplete behind. The lower jaw is large and strong.

In the two-toed sloth there are no pro-dorsal or supernumerary vertebræ in the neck; the feet are far less universally consolidated together.

Family—GRAVIGRADA, Owen.

Feet short, very strong, equal or subequal; fore-feet with five or four toes, of which one or two of the outermost are unarmed, fit for support and progression; the rest are armed with huge claws. Zygomatic arch complete, clavicles perfect; tail moderate or stout, acting as a fulcrum or prop.

Such are the characters of this family, as laid down by Professor Owen. It contains the following genera:—*Megalonyx*, *Megatherium*, *Mylodon*, *Scelidotherium*, *Cælodon*, and *Sphenodon*; of these genera all the species are extinct, and only known from their fossil relics.

Mylodon robustus.

From the skeleton of this extinct giant, now preserved in the Royal College of Surgeons, we see that, except that it was formed for tearing down the trees of the forest, and not living in their branches, it was closely

related to the comparatively pigmy sloths of the present day. Conceive of a sloth of the size and bulk of a rhinoceros or hippopotamus, but with bones infinitely more massive, muscles infinitely more voluminous and powerful, with a thick tail acting as a support, and forming with the hind-limbs a firm tripod, while the animal, thus raised upright, and exerting its enormous strength, sways the tree to and fro, and lays it at last prostrate;—and our reader will have a good idea of what this mighty devastator of the primitive forests of South America must have been.

The skeleton in question was discovered, as we are informed by Professor Owen, "in the year 1841 by M. Pedro de Angelis, seven leagues north of the city of Buenos Ayres, in the fluviatile deposits constituting the extensive plain intersected by the great Rio Plata and its tributaries, and which has been raised during a recent geological epoch above the level of the sea.

"In this formation, and most probably anterior to its elevation, the animal must have been buried entire, and, if the present heat of the climate prevailed, soon after its death, for the parts of the skeleton were found little disturbed, and the very few bones that are wanting are such as would be likely to escape the search of the most diligent collector.

"About the same time and near the same place a tesselated osseous carapace of some large quadruped like an armadillo was exhumed, and information of this discovery having been communicated to the Royal College of Surgeons by Sir Woodbine Parish, late Her Majesty's Chargé d'Affaires at Buenos Ayres, both this carapace and the above-mentioned skeleton were purchased by the College. They arrived in November, 1841, in many pieces, fragile from the loss of the animal matter; but having been restored in some measure to their original tenacity, the parts of the carapace were re-united, the skeleton was articulated, and both are now placed in the museum."

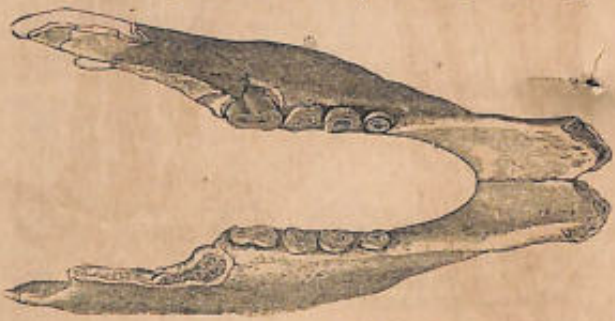
We may here observe that the tesselated carapace belongs to a large extinct armadillo, to which the largest

living species, the *Dasypus gigas*, is but a pigmy; it is termed by Professor Owen *Glyptodon clavipes*.

With respect to the fossil genus *Mylodon*, Professor Owen describes three distinct species, viz. *M. Darwinii*, *M. Harlani*, and *M. robustus*, which far exceeds the others in size.

We regret that want of space prevents us from following Professor Owen through his elaborate examination of the skeleton of *Mylodon robustus*, which to the scientific is replete with interest, nor enter into the affinities of the mylodon to the megatherium, megalonyx, and other extinct Edentata, which are rigidly scrutinized.

Fig. 106 represents the lower jaw of mylodon: Fig.



106.—Lower Jaw of Mylodon.

107.—Right branch of the above; external view.

108.—Tooth of Mylodon.

109.—Tooth of Mylodon.

107, the external view of the right branch of the lower jaw of mylodon. Figs. 108 and 109, the simple teeth of mylodon, showing the depth of their implantation. The cavity at the base of the tooth is seen at *a*, Fig. 108. As in the sloth, the megatherium, and megalonyx, these teeth, formed for crushing leaves, are composed of a central pillar of coarse ivory, immediately invested with a thin layer of fine dense ivory, and the whole surrounded with a thick coating of cement.

From the structure of these teeth it is evident that the

mylodon fed on leaves, like the sloths of the present day. But, notwithstanding Dr. Lund's opinion, it was certainly not adapted for climbing trees; besides, what trees could bear its weight? How then did it obtain its food? The whole of its osseous conformation suggests the answer—it was formed to uprend the trees that bore its sustenance. The enormous expanse of the pelvis, the great bulk and strength of the hind-legs, the solidity of the tail, to which its evidently vast muscles were attached, enabling it with the hind-limbs to complete a firm tripod of support, the proportions of the fore-limbs, unequalled for massiveness by those of any existing or extinct animal, the size and strength of its claws,—in short the whole mechanism of the colossal frame becomes intelligible only on the ground of the herculean labour to which the animal was appointed. Perhaps it commenced the process of prostrating the chosen tree by scratching away the soil from the roots, and then proceeded to grapple with it thus partially undermined, and apply the surpassing strength of its limbs and body, the muscles of the trunk and extremities being animated by the influence of the unusually large spinal chord.

It may here be stated that the skull of the specimen described by Professor Owen had at some time or other been fractured and had healed; the animal living long afterwards: and it will at once occur to the reader that these animals must have been unusually liable, from their habits, to blows from heavy falling bodies; to meet such accidents the skull was peculiarly constructed, its outer and inner table being separated by extensive air-cells, so that the fracture of the outer table might occur without injury to the brain. It was by virtue of this structure that the subject of the Professor's memoir appears to have been saved.

Scelidotherium.

Our Figures represent—Fig. 110, the remains of the skull; Figs. 111, 112, the dentition of an extinct animal, to which Professor Owen has given the title of Scelidotherium. Figs. 113, 114, show the depth of the im-

110.—Remains of Skull of Scelidotherium.

111.

112.

plantation of the teeth and their structure: *e*, the crown of a tooth seen from above.

This animal was evidently allied to the mylodon and megatherium, and belongs to the same family.

The fossil remains, viz. a cranium, several vertebræ, the scapulæ, and various bones of the limbs, were discovered by Mr. Darwin at Punta Alta, in northern Patagonia, and in the same bed of partly consolidated gravel as that wherein the lower jaws of toxodon and a species of mylodon were imbedded. All the parts were

113.

114.

discovered in their natural relative position, indicating, as Mr. Darwin observes, that the sublittoral formation in which they had been originally deposited had been but little disturbed. This beach is covered at spring-tides, and many portions of the skeleton were encrusted with *flustræ*. Small marine shells were lodged within the crevices of the bones.

The teeth in structure resemble those of the mylodon; there are neither incisors nor canines; the molars are five on each side above, and four below. According to Professor Owen, of all the Edentata the Cape Ant-eater, or Aard-vark, most nearly resembles the scelidotherium in the form of the skull; and next to the aard-vark may be cited the great armadillo (*Dasypus gigas*).

"Although the Scelidothere, like most other Edentals, was of low stature, and, like the megatherium, presented a disproportionate development of the hinder parts, it is probable that, bulk for bulk, it equalled, when alive, the largest existing pachyderms not proboscidean. There is no evidence that it possessed a tesselated osseous coat of mail."

The Megatherium.

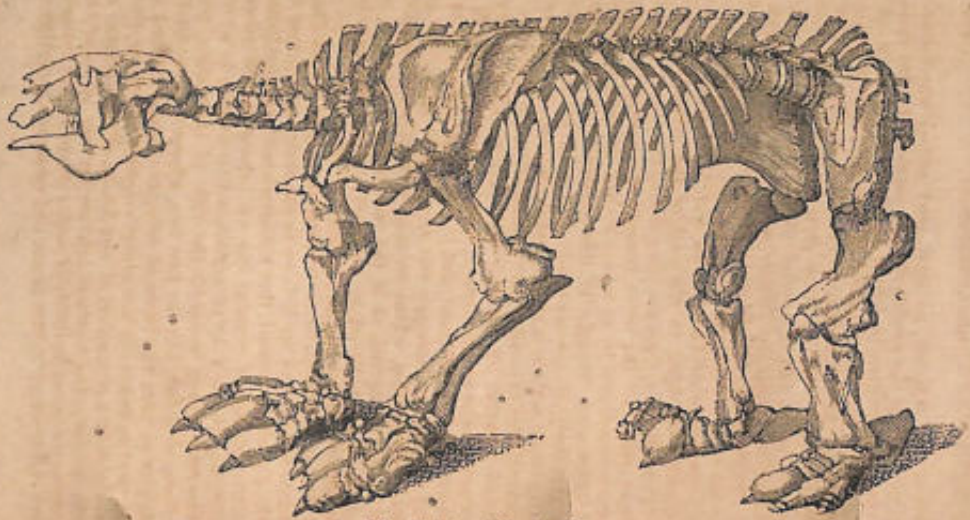
The relics of this colossal beast, of which Fig. 116 represents the skeleton, have been discovered only in South America, of which continent, at some remote period, it was an inhabitant.

The affinity of this animal to the sloths and other Edentata was pointed out by Cuvier, but many points required elucidation; in fact zoologists have been led, not without apparent grounds, into some errors, recently corrected.

For a long time the museum of Madrid afforded the only relics of the megatherium in Europe; but the skeleton they compose is deficient in several of its parts: fortunately the recent acquisition by the Royal College of Surgeons of a great portion of the bones of this animal has tended to supply the defects, at least to a considerable extent.

These splendid and valuable remains form the subject of an interesting paper from the pen of Mr. Clift, in the third vol., p. 3, of the 'Trans. Geol. Soc. Lond.,' accompanied by an improved figure of the skeleton, and figures of various detached parts, together with a map of that part of the province of Buenos Ayres in which the places where the bones in question were found, and also those of the Madrid specimen, are marked down.

The acquisition of these remains by the Royal College of Surgeons is due to the zeal and liberality of Woodbine Parish, Esq. "They were found in the river Salado, which runs through the flat alluvial plains to the south of the city of Buenos Ayres. Their discovery was owing to a succession of unusually dry seasons in the three preceding years, which lowered the waters in an extraordinary degree, and exposed part of the pelvis to view as it stood upright in the bottom of the river. It appears that this and some other parts of the skeleton, having been carried to Buenos Ayres by the country-people, were very liberally placed at Mr. Parish's disposal by Don Hilario Sosa, the owner of the property on which they were found. In the hope of obtaining the other



116.—Skeleton of Megatherium.

parts of the skeleton, an intelligent person was subsequently sent to the same spot, who succeeded, after considerable difficulties, in getting out of the mud forming the bed of the river the remainder of the collection. Further inquiry led Mr. Parish to suppose that similar remains might be met with in other parts of the provinces of Buenos Ayres, and he applied to the local authorities to assist him in making further search. This was given by the governor, Don Manuel Rosas, and the remains of the other two skeletons were found on his Excellency's own properties of Las Averias and Villanueva, one to the north, the other to the south of the Salado, but at no great distance from the place where the first had been discovered. In the latter instance the osseous remains were accompanied by an immense shell, or case, portions of which were brought to this country." A fragment of this shell, or osseous shield, is figured by Mr. Clift; its external surface is rough, and it appears to consist of an assemblage of smaller parts, like rosettes in sculpture, united together by sutures; the sutures being plainly marked on the under surface, which is smooth. By M. Blainville, Dr. Buckland, and indeed by most naturalists, this buckler or carapace was regarded as belonging to the megatherium, whose colossal bulk it was regarded as having protected, as is the case in the armadillos, to which it was believed to be closely related, not only in structure and habits, but also food.

It has, however, been recently demonstrated by Professor Owen, and we believe to the entire satisfaction of Dr. Buckland himself, that the tesselated carapace found with the Salado remains did not belong to the megatherium, but to a large armadillo-like animal, to which Professor Owen assigned the title of Glyptodon, and whose hind-feet, like the fore foot, appear to be so modified as to form the bases of columnar limbs destined to support an enormous incumbent weight. Moreover, from a rigorous examination of the details of the skeleton of the megatherium, into which we forbear to enter, he proves the incompatibility of such a shield with its osseous structure, which differs in marked essentials from that of

the armadillo, in which latter animal the skeleton is expressly modified for the armour which covers the back and head.

In his paper on the Glyptodon, wherein the claims of the megatherium to this armour are discussed, Professor Owen gives a tabular account of the discovery of twelve skeletons of the megatherium, and in no instance did any portion of bony armour occur with or near the bone; and in a note the writer of the article 'Megatherium' in the 'Penny Cyclopædia' states as follows:—

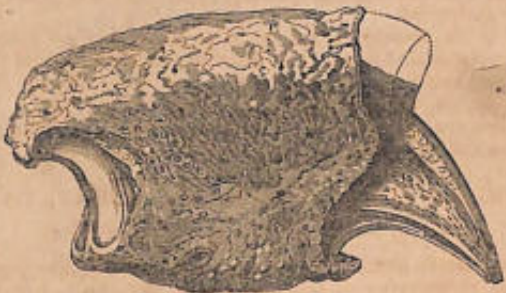
"Sir Woodbine Parish has just now (May 29, 1839) kindly communicated to us a letter received by him, giving information of the discovery of an almost entire skeleton of an adult megatherium on the banks of the Rio de la Matanza, with all the vertebræ of the body, all the ribs, all the teeth, the head and the legs, in short, with the whole of the bones except the tail and one foot. Close to it was the skeleton of a 'tatou gigantesque' (glyptodon probably), with its bony armour complete. There was also found a very small and perfect megatherium, which must have been only just born at the epoch of destruction. No mention is made of any traces of bony armour or shell about the megatheria. In the old animal only one foot is wanting. It has been suggested that the so-called young megatherium may possibly be a skeleton of scelidotherium."

It is then to the armadillo-like glyptodon, and not to the megatherium, that the strong bony armour belongs; of this latter animal relics have been found on the left bank of the Pedernal, near Monte Video, and are preserved in the Museum of that town. Portions of bony armour also have been obtained in the Rio Seco and Banda Oriental, similar in structure to the specimen of the Pedernal.

"The collection of fossils," says Professor Owen, "brought to England from South America by Mr. Darwin, has enabled me to add the following facts to the history of the megatherium. Its teeth, for example, do not differ in number from those of the sloths, there being five on each side of the upper jaw. Microscopic

117.—Pelvis and Hind Leg of Megatherium.

examination having demonstrated a marked difference in the intimate structure of the teeth of the sloths and armadillos, I have ascertained by this mode of investigation that the teeth of the megatherium have the same texture and composition as those of the sloth. And if from identity of dental structure in two different



118.—Ungual Phalanx of Megatherium.

119.—Tooth of Megatherium.

animals we may predicate a similarity in their food, a glance at the bony framework of the megatherium is sufficient to show that it must have resorted to other means of obtaining its leafy provender than that of climbing for it, whereby the necessity of inferring a proportionate magnitude of the trees which nourished the megatherium is obviated." It would appear that, like the mylodon, the megatherium uprooted the trees, on the leaves of which it fed, and was furnished with a small proboscis as an adjunct to the tongue in stripping off the smaller branches of the prostrate trees; its skull, moreover, has the two tables separated by cells, as in the mylodon. Fig. 117 represents the pelvis and hind-leg of the megatherium in the Royal College of Surgeons;

Fig. 118 the ungueal phalanx; Fig. 119 the teeth of megatherium.

With respect to the megalonyx, it was an animal closely related to the megatherium, and doubtless of the same habits, but of inferior size, not exceeding the size of an ox, though more solidly and heavily built. Its relics are apparently more rare than those of the megatherium, at least fewer have been recovered.

Section II. INSECTIVOROUS EDENTATA.

Family—LORICATA (or Armadillos).

This family group includes the true armadillos (*Dasypus*), the chlamyphorus, and also the aard-vark, or African ant-eater, which, though not covered with armour, approaches in its structure nearer to the armadillos than to the American ant-eaters (*Myrmecophaga*), with which animals it was formerly associated, and which it resembles very closely in manners and food.

The armadillos (*Dasypus*) are divided by Cuvier into five minor groups, or subgenera, according to the number of the teeth and fore-claws; viz. *Cachichames*, *Apars*, *Encouberts*, *Cabassous*, and *Priodontes*.

The *Cachichames* have four toes on each foot, and seven teeth on each side above and below. The *Apars* have four toes on each foot, and nine or ten teeth in each side in both jaws. The *Encouberts* have five toes on the fore-feet, and nine or ten teeth on each side above and below, with two incisor teeth in the upper. The *Cabassous* have five toes, but those of the fore-feet are disposed obliquely, and in such a manner that the thumb and index finger are small, the middle and fourth toes armed with tremendously large trenchant claws, and the fifth very small: teeth nine or ten on each side above and below. The *Priodontes*, in addition to the unequal toes and enormous claws of the *Cabassous*, have from twenty-two to twenty-four small teeth on each side in each jaw.

The armadillos are exclusively confined to the warmer portions of the American continent, and the species are tolerably numerous, none, however, attaining to a very

large size excepting the *Dasypus gigas*, which itself is but a pigmy to the extinct glyptodon.

These animals are burrowing in their habits, with thick, short, powerful limbs, and a flattened, broad, stout body, covered above with plates and bands of horny armour. The head is broad between the eyes, whence it runs to a pointed muzzle; the mouth is small: the teeth are cylindrical, feeble, destitute of true roots, set apart from each other, and mutually fit, when the jaws are closed, into the intervals. The tongue is smooth, slender, and moderately extensible: it is most probably endowed with the sense of taste in a high degree, as we have observed, especially in one species, the *Dasypus peba*, the animal touched with it whatever was presented by way of food; and we know that it is lubricated abundantly with a glutinous fluid, poured out chiefly from the submaxillary gland. (See 'Zool. Proceeds.' for 1831, p. 144.)

The portions of armour which cover these animals consist of a triangular or oval plate on the top of the head, or rather on the chaffron, its posterior margin projecting over the neck; a large buckler over the shoulders, and a similar buckler over the haunches; while between these solid portions there intervenes a series of transverse bands overlapping each other's edges, and allowing to the body due freedom of motion. Each of these separate portions consists of a multitude of small parts, all consolidated together, giving the idea of what is termed mosaic-work, especially on the head and shoulders, the pattern differing in different species. The limbs, which are short and thick, are almost entirely concealed by the edges of this armour, but the feet, which are unprotected by it, are covered by a hard tuberculated skin. The tail is covered with a series of calcareous rings; the skin of the under surface of the body is very rough and beset with long scattered hairs; and from between the joints of the rings and plates of the dorsal armour there issue hairs of the same kind, more numerous in young than adult individuals. In some species, however, as the mataco (*Dasypus apar*), whose armour is peculiarly thick and solid, no hair is to be discovered.

The eyes of the armadillos are small and lateral; the ears, varying in size in the different species, are firm, and covered with tuberculated skin. Most of the species are nocturnal in their habits, remaining concealed in their burrows during the day; these are of considerable extent, dipping at an inclination of about 45 degrees; they have one or two sharp turns, and are very narrow, just admitting the passage of their occupier. The animals make these burrows with great expedition, and can only be forced out by smoke or water; such is their strength and the tenacity of their hold, that they have been known to leave their tail in the hands of the hunter, on his attempt to drag them forth.

When alarmed during their excursions, the first endeavour of these animals is to gain their burrows, to which they run with a degree of celerity little to be expected from their clumsy appearance. Most of the species will easily outstrip a man; their movements, however, resemble those produced by mechanism, for, as the spinous processes of the vertebral column are all inclined the same way, viz. towards the tail, there being no central points to which those of the upper and those of the lower portion mutually converge, so the motions of the limbs are unaccompanied by corresponding inflexions of this column, as is the case in other animals whose progressive motions are free and unconstrained.

When hard pressed and unable to gain their burrow, they either attempt to dig a temporary place of refuge, or they gather up their limbs beneath their coat of mail, bend down their head, assume a partially rolled-up figure, and wait the event. The mataco, which does not burrow, and is by no means swift, can roll itself up completely. They never attempt to bite or otherwise defend themselves. The food of the armadillos consists principally of fallen fruits, roots, and worms; but they do not reject carrion, and have been known to penetrate into graves, when not properly protected by stones or brick-work. Azara informs us that ants are never found in the districts inhabited by the armadillos, and that these animals break into the ant-hills, and devour the insects as greedily as

the true ant-eaters. Nature, it is true, has not provided them with the same apparatus for this purpose, but the armadillos may, notwithstanding, destroy vast quantities of ants, though it is probable that they expel them from their own peculiar districts as much at least by destroying the habitations as by actually devouring the insects themselves. The ordinary food of the armadillos consists chiefly of the roots of the manioc, of potatoes, maize, and other similar substances of a vegetable nature, though, as already observed, without rejecting animal substances naturally soft or so far decomposed as to be easily torn without the help of canine teeth. They are also very destructive to the eggs and young of such birds as build their nests on the ground, and greedily devour worms, frogs, small lizards, and, M. Azara says, even vipers. The chief animal food of the armadillos, however, is derived from the immense herds of wild cattle which cover the plains and savannas of every part of South America. These are rarely slaughtered but for the sake of the hide and tallow; and as the carcases are left to rot on the pampas, or plains, the smell soon attracts vast crowds of carnivorous animals of various species, and, among others, great numbers of armadillos, which greedily devour the half-putrid flesh, and soon become extremely fat and corpulent. In this condition, notwithstanding the filthy nature of their food, their flesh is esteemed a great delicacy, both by the native Indians and by the Portuguese and Spaniards of America. The animal is roasted in its shell; and considered one of the greatest dainties which the country produces.

The armadillos see but indifferently, particularly in bright sunshiny weather; but their sense of hearing is extremely acute, and amply compensates for any imperfection of sight. When alarmed by any unusual or strange sound, they prick up their ears, stop for a moment to satisfy themselves of its distance and direction, then commence a precipitate retreat to their burrow, or, if that be too remote, begin to construct a new one. Smell is, however, by far the most acute of their senses.

It is generally believed that the female armadillo

brings forth but once during the year, but she produces at a birth frequently six, eight, or even ten young ones: yet she has never more than four teats, and, according to the report of M. Azara, the most accurate and extensive observer who has written upon the history of these animals, in some species only two—an anomaly, with respect to the number of young and the number of teats, which appears to contradict the general rule observable among other mammals.

It may here be observed that one of the weasel-headed armadillos (*D. encoubert*) in the Zoological Gardens produced only two at a birth: when first born they were quite blind, about four inches in length, soft, and white, but the skin presented all the furrows and mosaic-work which characterize it when indurated and solid. The growth of these animals was not a little surprising; in six or eight weeks they attained nearly to the size of their parents. One born on the 3rd of September, 1831, and which died on the 16th of November of the same year, had increased in weight during that short period 52 ounces 2 drams, and measured 11½ inches from the nose to the root of the tail. The young are far more hairy than the adults.

The Peba (*Dasypus peba*).

The Tatouhou, or Black Tatu, of the Guaranis, is an example of Cuvier's group of Cachichames, which, according to Gumilla, is the general name of the armadillos on the banks of the Orinoco. In zoological catalogues we find it under the ambiguous names of *Dasypus septemcinctus*, *D. octocinctus*, and *D. novemcinctus*; three different species being thus made out from the erroneous supposition that the number of moveable bands on the back was invariable in the same species: whereas the truth is that the number of bands is subject to a certain degree of variation; thus in the mule armadillo there are six or seven bands, in the peba from six to nine. It appears also that the young have not the full complement of bands, by one or two, which become developed afterwards. The peba (Fig. 120) is a native of Guiana,

120.—Peba.

Brazil, and Paraguay, and is timid and nocturnal; it is tolerably rapid in its movements, and very expert in burrowing.

It is never found in woods, but frequents the open and cultivated plains, and is much hunted by the inhabitants on account of its flesh, which, when roasted in the shell, is said to be extremely delicate, resembling that of a sucking-pig.

The length of the head and body is about sixteen inches; of the tail, which is slender and tapering, fourteen inches. The muzzle is greatly elongated, straight and pointed; the ears are rather large and the eyes small; the tongue long, narrow, pointed, and extensible. The general colour of the shell is dusky black.

Allied to the peba is the mule armadillo (*Dasypus hybridus*, Desm.), called M. Courigua, or Mule Tatu, by the Guaranis, in allusion to its long upright ears. It is of smaller size than the peba, and its tail is comparatively shorter. It wanders by day over the plains, feeding on beetles, larvæ, roots, &c.; differing from the peba in being diurnal in its habits. It is common on the pampas of Buenos Ayres.

The Mataco (*Dasypus apar*).

This species is an example of Cuvier's group of apars. The Mataco, or Bolita (little ball) as it is sometimes called, has its shell of defence extremely hard and solid, forming an admirable coat of mail. It has only three

121.—Mataco.

bands on the back. Of all the armadillos, the mataco is the only one which can assume the complete figure of a ball, enclosing the head and legs; and this faculty, together with the strength of the skull, appears the more necessary, as it does not burrow, its limbs being feeble, and its claws little adapted for scratching up the ground. It is diurnal in its habits, and slow in its movements. It is a native of the pampas of Buenos Ayres; the tail is short, not much exceeding two inches in length, while the head and body measure nearly fifteen inches. (Fig. 121.) Rolled up in its tesselated shell, it is safe from the attacks of dogs; "For the dog," says Mr. Darwin, "not being able to take the whole in its mouth, tries to bite one side, and the ball slips away. The smooth hard covering of the mataco offers a better defence than the sharp pines of the hedgehog." A shell of this species, which formed the cup of a cacique, is in the Mus. Zool. Soc.

The Poyou, or Weasel-headed Armadillo

(*Dasypus encoubert*, Desm.).

This Armadillo belongs to Cuvier's section termed *Encoubert*: it is very common in Paraguay, and burrows in the ground with almost incredible celerity. Its strength and activity are very remarkable, and, notwithstanding the shortness of its legs, few men can overtake it. It is of a restless unquiet disposition, inquisitive, and confident; and when any noise is made at the entrance of its burrow, it is said to come fearlessly forth to investigate the cause. Its voice is a low grunt, like that of a young pig. These animals live solitary or in pairs, and haunt wooded districts, where they excavate very deep burrows; when danger threatens, they carry on their mining operations, rendering it difficult to dig them out. They feed upon melons, potatoes, and other vegetables; but also to a great extent upon carrion; the natives nevertheless eat the flesh of this species without any repugnance. When it stops or rests on the ground, it has a habit of squatting like a hare in her form, and

122.—Weasel-headed Armadillo.

in this situation the great breadth of the body is very apparent. The head is large, flat, and nearly triangular; the face short, and the muzzle blunt; the ears are moderate.

Several individuals of this armadillo have at various times lived in the menagerie of the Zoological Society. They appear to have little fear, and soon become familiar even with strangers: when running about their enclosure, during warm or sunny weather, they turn up the turf rapidly with their noses, apparently in search of worms or insects; bread and milk is the diet on which they are fed: their actions are prompt and rapid. The poyou measures about sixteen inches in the length of the head and body; the tail is about six or seven inches long. (Fig. 122.)

Another example of this section is the Pichiy, or

Pichy (*Dasypus minutus*). It is extremely abundant on the arid plains near the Sierra Ventana, and likewise in the neighbourhood of the Rio Negro. "At Bahia Blanca," says Mr. Darwin, "I found, in the stomach of this armadillo, coleoptera, larvæ, roots of plants, and even a small snake of the genus Amphisbœna.

"The pichy prefers a dry soil; and the sand-dunes near the coast, where for many months it can never taste water, are its favourite resort. In the course of a day's ride near Bahia Blanca several were generally met with. The instant one was observed, it was necessary, in order to catch it, almost to tumble off one's horse: for if the soil was soft, the animal burrowed so quickly, that its hinder quarters almost disappeared before one could alight. The pichy likewise often tries to escape notice by squatting close to the ground. It appears almost a pity to kill such nice little animals; for, as a Gaucho said while sharpening his knife on the back of one, 'Son tan mansos' (They are so quiet)."

The pichy measures only ten inches in the length of the head and body, and about four inches in that of the tail. It is diurnal in its habits.

The Tatouay (*Dasypus tatouay*, Desm.).

This species is an example for Cuvier's section *Cabassous*. The Tatouay, or wounded Armadillo, is so called by the Indians in allusion to its tail, which is naked, or as it were rudely deprived of the crust or bony tube which covers this organ in all the other species. The whole length of the tatouay, as given by Azara, is twenty-six inches and a half, including the tail, which is seven inches and a half, round, pointed, and naked, with the exception of a few round scales or crusts on the under surface of the third nearest to the extremity, which frequently trails along the ground when the animal walks: the rest is covered with soft brown fur, interspersed with a few stiff short hairs on the superior surface. The head is longer, narrower, and more attenuated than that of the poyou, though considerably less so than in the peba and mule armadillo; the ears are unusually large, being

nearly two inches long, and in figure forming a segment of a circle; the body is round; the claws of the fore-feet, particularly that of the middle toe, are excessively large. The bucklers of the croup and shoulders are composed of ten and seven rows of scales respectively, each scale forming an oblong rectangle; the moveable bands are thirteen in number, composed of scales much smaller than those of the bucklers, and of a nearly square figure. (Fig. 123.) The habits of this species are altogether unknown. It inhabits Guiana and Brazil, and is rarely found so far south as Paraguay.

Fig. 123.—Tatouay.

THE GREAT ARMADILLO (*Dasypus gigas*).

This armadillo is an example of Cuvier's group *Priodontes*. The Great Armadillo measures nearly three feet three inches in length, from the nose to the origin

124.—The Great Armadillo.

of the tail; the head is seven inches and a half long, the ears an inch and three-quarters, and the tail one foot five inches. Its superior size is alone sufficient to distinguish this species from all the other known armadillos, but it possesses numerous other characters not less remarkable. Its head is proportionately smaller than in the other species, the forehead is more protuberant, and the face, from the eyes downwards, assumes a tubular cylindrical form, like that of the peba; the ears are of a moderate size, pointed, and habitually crouched backwards; the bucklers of the shoulders and croup are composed of nine and eighteen rows of plates respectively, and separated by moveable bands to the number of twelve or thirteen, formed of rectangular scales, about half an inch square. The tail is thick at the root, being upwards of ten inches in circumference: it is gradually attenuated towards the tip, covered with plates disposed in rings at

the base, and forming spiral or crescent-shaped lines throughout the rest of its length. The claws are large and powerful, but in their relative form and dimensions differ little from those of the tatouay already described. (Fig. 124.)

This species inhabits Brazil and the northern parts of Paraguay. It is never found in the open country, but keeps close to the great forests, and burrows with surprising facility. Those who are employed in collecting the Jesuits' bark frequently meet with it in the woods, and report that, when any of their companions happen to die at a distance from the settlements, they are obliged to surround the body with a double row of stout planks, to prevent it from being scratched up and devoured by the great armadillo.

Genus *Chlamyphorus:*

THE PICHICIAGO (*Chlamyphorus truncatus*).

This extraordinary little creature, though scarcely six inches in length, is formed on the plan of the utmost strength and solidity, being destined for burrowing habits. It is a native of Chili, where, like a mole, it works out galleries in the rich soil of the valleys, living for the most part underground in quiet seclusion. So rare is this animal, that it is regarded by the natives as a curiosity. Its food, so far as we are assured by its dentition and the imperfect accounts collected, consists of insects and larvæ: night probably is the season of its activity, and of its unfrequent visits to the "upper world."

The appearance of the pichiciago reminds us of the armadillos, for it is covered above by a shell, not however of very hard consistence, nor very thick, but of a texture between horn and leather. This shield-like plate commences on the head and extends over the back and haunches, over which latter it dips down quite abruptly and perpendicularly, so as to make it seem as if the body was cut off abruptly at its hinder part. It is divided by intersecting furrows into a series of bands or strips, each strip being itself made up of fifteen or twenty plates of a square form, except on the head, which is

125.—Extremity and Tail of Pichiciago.

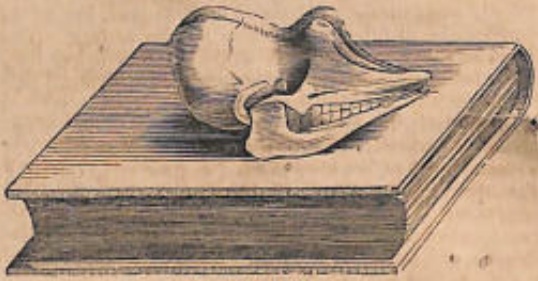
covered with a single plate composed of a mosaic-work of rounded and irregular portions, and the perpendicular haunch-plate, which is also tesselated. This horny covering or shield is not fixed by the whole of its inferior surface to the integuments beneath, as is the case with the armadillo; but merely rests on the back, free throughout, "excepting along the spine of the back and top of the head; being attached to the back, immediately above the spine, by a loose cuticular production, and by two remarkable bony processes on the top of the os frontis (bone of forehead), by means of two large plates which are nearly incorporated with the bone beneath: but for this attachment, and the tail being firmly curved beneath the belly, the covering would be very easily de-

tached." The extremity of the tail is formed like a paddle. (Fig. 125.) "The whole surface of the body and underside of the shield are covered with fine silk-like hair (of a delicate straw colour), longer and finer than that of the mole, but not so thick. The anterior of the chest is large, full, and strong; the anterior extremities short, clumsy, and powerful." The hand, which is amazingly thick and compact, is furnished with five powerful but compressed nails, which, arranged together in their natural situation, constitute one of the most efficient scrapers or shovels which can be possibly imagined; and expressly adapted for progression underground, but in an equal ratio ill fitted for celerity on the surface. The hind-legs are comparatively weak, the feet being long and plantigrade, the toes being furnished with small flattened nails. (Fig. 126.) Sight is but a secondary sense as regards its importance in the economy of an animal living in darkness beneath the ground. The organs of vision, therefore, are very minute, and buried in the silky fur by which the circular orifices of the ears are com-

126.—Pichiciago.

pletely concealed. The head is almost conical in figure, going off from a broad base to a pointed muzzle furnished with an enlarged cartilage, somewhat as in the hog, and doubtless for the purpose of grubbing and burrowing for food.

In accordance with the details of external configuration, the skeleton is equally indicative of the animal's habits. The skull is firm, and prevented from being pressed upon by the shield, which rests on the two projections. The bones of the fore-limbs are short, thick, and angular; the scapulæ broad and strong; the ribs



127.—Skull of Pichiciago.

128.

129.

130.

131.

thick, and capable of resisting great pressure. The hip-bones are of singular construction, and admirably formed for protecting the internal organs from injury. Such is an outline of the structure and habits of the chlamyphorus, an animal which, though bearing in some points a resemblance to the armadillos, yet possesses characters so exclusively its own as to render it one of the most interesting discoveries in zoology. Of this rare animal two specimens alone exist, one in the Museum of Philadelphia, the other, with its skeleton, in the Museum of the Zoological Society, London.

For an account of the structure of this animal, see Mr. Yarrell's paper in the 'Zoological Journal.' Fig. 127

132.

133.

134.—Skeleton of Pithecinga.

135.

represents a lateral view of the skull of the pichiciago; Fig. 128, an upper view; Fig. 129, a basal view of the same; Fig. 130, lower jaw; Fig. 131, the cervical vertebræ, and first bone of the sternum, with parts of the first and second ribs seen from below. Fig. 132, pelvis seen from behind; Fig. 133, same seen from below: Fig. 134, the skeleton; Fig. 135, vertebræ of tail.

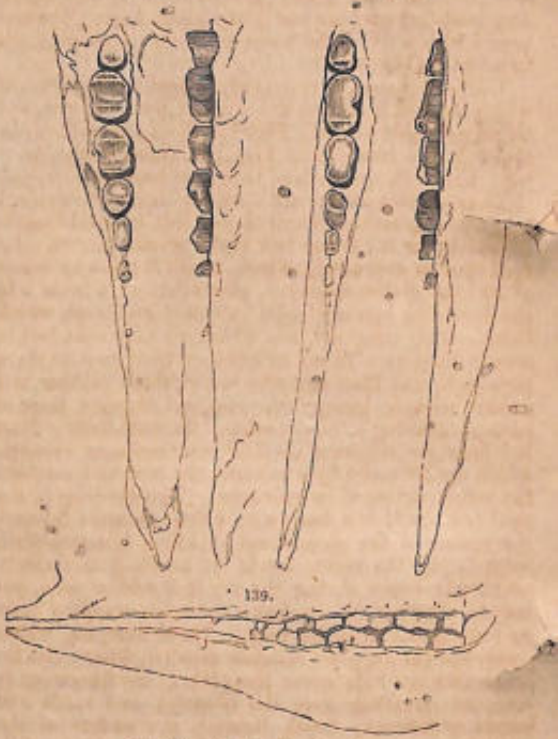
Genus *Orycteropus*:—

THE AARD-VARK (*Orycteropus Capensis*).

This animal, known to the colonists of the Cape of Good Hope by the name of aard-vark, or earth-hog, is the sole example, as far as ascertained, of the genus *Orycteropus*. The aard-vark is essentially burrowing in its habits, and insectivorous in its diet. Its proportions are thick and strong, though the general contour is

136.—Aard-vark.

elongated and the limbs short. It is neither protected by plates nor scales, but the skin is thick, tough, and coarse, and covered with stiff hair, resembling bristles in quality, and somewhat scantily disposed, especially on the head. The muzzle is elongated, narrow, and hog-



137-139.—Teeth of Aard-vark.

like at its apex; the mouth small, and the tongue extensible; the eyes are rather small; the ears large, long, and pointed; the tail tapering from a very stout base; the limbs are short, thick, and very muscular; the fore-feet have four stout toes armed with large solid nails, resembling hoofs in appearance, and admirably adapted as scrapers of the dry hard ground of an African desert. The hind-feet are long and plantigrade, having five toes armed with nails of the same character as those of the fore-feet. (Fig. 136.)

The teeth consist of seven molars on each side above, of which the first is minute and distinct from the rest, and six on each side below. Fig. 137 gives the teeth of the upper jaw in two views; Fig. 138, those of the lower jaw; Fig. 139, the teeth of both jaws together.

The aard-vark attains to a considerable size, measuring, when fully grown, upwards of five feet in total length, of which the tail is one foot eight or nine inches. Its food consists exclusively of ants, which it takes by means of its long glutinous tongue, after effecting a breach in the dome-like houses of solid indurated mud-work which those insects construct, and which are very abundant in certain districts. These hillocks are from two to three feet high, and their structure is irregularly cellular, not unlike volcanic honeycomb-stone, exhibiting a maze of passages opening into each other. In demolishing these buildings for the sake of their multitudinous inmates, which are devoured by wholesale, the aard-vark employs the active portion of its existence. The dwelling of the aard-vark itself is a burrow at a little distance beneath the surface of the ground, out of which it comes forth only during the night, for in its habits it is entirely nocturnal; hence during the day it is seldom seen, but may be observed as the dusk approaches creeping from its hole intent upon its prey. These burrows, where numerous (as they are in some districts, where also innumerable ant-hills cover the plain), are dangerous to waggons travelling over the country; and cattle and horses occasionally break through the surface of the ground into them, and thus suddenly stumble or fall.

They are often very extensive, and it is incredible with what despatch the animal makes them, and with what rapidity it mines onwards when endeavouring to elude the search of persons attempting to dig it out of its retreat; hence it is not captured without difficulty. The flesh of the aard-vark, and especially the hind-quarters when made into hams, are accounted excellent.

The aard-vark is a connecting link between the armadillos and the next section.

Family—TOOTHLESS ANT-EATERS.

Genus *Myrmecophaga*.

The genus *Myrmecophaga*, as established by Linnæus and retained by Desmarest and others, is not strictly natural. Perhaps we should hardly be justified in separating the Tamandua from the Tamanoir (Great Ant-bear, or Ant-eater); but with respect to the little two-clawed ant-eater it certainly forms the type of a distinct genus.

The Great Ant-eater, or Ant-bear

(*Myrmecophaga jubata*).

The Tamanoir of Buffon. This species, a native of Guiana, Brazil, and Paraguay, is characterized by the total absence of teeth, a narrow head with an extremely slender elongated snout, contrasting strangely with the clumsy massive contour of the limbs and body. The mouth is a small slit at the extremity of the snout; the eyes are small, and the tongue long, cylindrical, and protractile, constituting an organ for obtaining insect food, and is lubricated by a gummy saliva; the limbs are short, but of great thickness, furnished with huge hook-like claws well adapted for making forcible entrance into the solid dwellings of the termite ants. The claws of the fore-feet are four in number, the inner one being the smallest; of the hind-feet five. Those of the fore-feet, in a state of repose or when the animal is walking, are doubled inwards on a rough callous pad, and the outer portion only of the fore-feet is applied to the ground.

The claws of the hind-feet are short, and the sole is a naked protuberant pad. The ears are short and round; the tail is of great thickness at the base, whence it narrows to the apex, being laterally compressed, but its form is hid beneath a profusion of long, coarse, flowing hair, which hangs like a full plume or fringe. The hair of the head is short and close, but over all the rest of the animal it is long and shaggy, particularly on the top of the neck and along the back, where it forms a kind of long mane, and on the tail, where it is a foot in length, and hangs down on each side, sweeping the ground when the ant-bear walks. (Fig. 140.)

The prevailing colour on the head, face, and cheeks

140.—Great Ant-eater.

of the ant-bear is a mixture of gray and brown; that on the upper parts of the body and tail is deep brown, mixed with silvery white. A broad black band, bordered on each side with a similar one of a white or light grayish brown colour, commences on the chest, and passes obliquely over each shoulder, diminishing gradually as it approaches the loins, where it ends in a point. The sides, arms, and thighs are silvery gray, with a slight mixture of brown, marked with two deep black spots, one on the carpus, and the other on the toes; the hind legs are almost perfectly black, and the breast and belly of a deep brown, almost equally obscure.

The following is an abstract of the habits of this animal, as observed by Dr. Schomburgk (see 'Zool. Proceedings,' 1839, p. 21):—

Dr. Schomburgk observes, that at a distance the ant-bear appears to be a much taller animal than it really is, owing to the elongated and nearly erect hair of the mane, and also the erect manner in which it carries its large bushy tail. When walking, the outer portion of the fore-foot is applied to the ground, and the long claws are then doubled inwards. It runs with a peculiar trot, and is not, as has been represented, slow in its movements and easily overtaken; for when chased, it will keep a horse in canter, and does not tire readily. White ants or termites, constitute its chief food. When the ant-bear meets with one of the tumuli constructed by the white ants, it immediately pulls the fabric down by means of its large strong claws, and when the ants are thus exposed, its long slender tongue is thrust out to collect them. The movements of the tongue, alternately being protruded and retracted, are so rapid, says Dr. Schomburgk, that it is no longer surprising how so large an animal can satiate its appetite with such minute insects. The ant-bear is, however, an economist, and does not destroy more than he wants. When he finds that the termites diminish on the surface, and every one seeks to escape in the numerous galleries of the ruined edifice, he uses his left foot to hold some large lumps of the nest, whilst with the right he leisurely pulls them to pieces.

With the termites he swallows a considerable quantity of the material of which the ants' nest is constructed. Of this fact Dr. Schomburgk assured himself by dissection, and he is of opinion that the substance of the nest serves as a corrector.

"It has been generally thought," says Dr. Schomburgk, "that the ant-bear lives exclusively on ants; this, however, is not the case. In one which I dissected a year ago a species of julus was found; and the avidity with which an adult one now in my possession swallowed fresh meat, which was hashed up for it, makes me believe that even in the wild state it does not satisfy itself exclusively with ants, and, provided the food is of such a size that it can take it up with its moveable upper lip, it does not despise it." According to the same authority the great ant-eater makes no burrow, its tail serving as a sufficient protection: the female produces a single offspring, which she carries on her back; she defends herself by striking with her fore-feet, while raised on her haunches, or throws herself on her back, dealing blows with both her claws. The young soon become tame and familiar, growl like a puppy, or utter a plaintive whine. The sense of smell is exquisite; and the animal is directed more by this than by sight. The teats of the female are two and pectoral. The young remains with its parent for the space of a year.

Dr. Schomburgk domesticated an adult female ant-eater, which he found capable of climbing with great facility and also of taking up objects with its paws. It ate beef, and even fish cut small. When not asleep, it rested on its haunches; but in feeding kneeled as goats and sheep often do. Its height was three feet; the length of the head one foot three inches; of the back three feet seven inches; of the tail three feet six inches.

The Tamandua

(*Myrmecophaga tamandua*, Cuv.; the Middle Ant-eater, Shaw; the Cagouaré of Azara).

This species is a native of Brazil and Paraguay. In the general plan of its osteology the tamandua agrees

141.—Tamandua.

with the tamanoir, but the bones of the muzzle are shorter than the cranial portion, instead of being twice as long: hence the whole head is more abbreviated: the snout is also more conical, and presents a less tubular appearance. Independently, however, of this difference, the tamandua is easily distinguished from its congener. It is far inferior in size, and its tail, instead of being furnished with full flowing hair, is a long, taper, thinly covered organ of prehension, nearly naked indeed at the tip, though well covered at the base. The fur of the body is thick, dense, and harsh, and on the hinder quarters of tolerable length, but on the head and forequarters it is short, wiry, upright, and glossy, and radiates from an areola between the shoulders; the point of the muzzle is bare; the eyes are small; the ears of a moderate size and rounded: the mouth is small, and the nostrils are lateral slits. (Fig. 141.)

In the structure of the limbs it closely resembles its larger congener. The tamandua when fully grown measures about two feet in the length of the head and body, and sixteen or seventeen inches in that of the tail.

A young specimen before us measures nineteen inches in the body, and thirteen in the tail; its colour on the head and fore-quarters is yellowish white; the sides of the body, the haunches, and the under surface, together with the base of the tail, being black, and a black stripe passes along each shoulder.

M. Geoffroy regards as distinct species one altogether black, which he terms *T. nigra*, and another with a double shoulder-stripe, which he has named *T. bivittata*. They are, however, most probably only varieties; at least Cuvier states, in his 'Ossemens Fossiles,' that, however these animals may vary in colour, they present no difference in their proportions, nor in the details of their skeletons, though he has rigidly compared them together. Azara tells us that he once found dead a cagouaré thirty-seven inches and three-quarters long, which was of an universal yellowish white; whence he concludes that the perfect livery is not gained until the second year. The young are of an universal pale cinnamon colour.

In its manners the tamandua agrees with the tamanoir, with this difference, that it often climbs trees, aiding itself by its prehensile tail, which, however, is much inferior as a prehensile organ to that of the little two-toed ant-eater, and its claws are also less calculated for arboreal habits. Azara suspects that it feeds much upon honey and bees, which, he adds, are here (in Paraguay) destitute of stings, and take up their abode in trees. When reposing, the tamandua doubles its head on its chest, lies on its belly, places its fore-limbs along its sides and its tail over its body. It smells strongly of musk, and the odour, when the animal is irritated, is very disagreeable, and may be perceived at a great distance. The female produces one at a birth; it is, says Azara, very ugly, and is carried by the mother on her shoulders.

The Little Ant-eater

(*Myrmecophaga didactyla*, Linn.).

The distinguishing characters of this species consist

142.—Little Ant-eater.

in the shortness of the muzzle, which is conical; in the number of the claws, which are two on each fore-foot, of hook-like shape, compressed laterally and very sharp, the outer one being considerably the largest; in the oblique position of the hind-feet, which are armed with four short compressed claws; and lastly in the strongly prehensile power of the tail, which is very long and covered with fine silky fur, like that of the body, except for three inches of the under surface at the tip, where, as in the spider-monkey, it is perfectly naked. The claws of the fore-feet, which resemble those of the sloth, are folded down on a callous pad, and with these the little creature can cling to a branch, while the inward tourniure of the hind-limbs combines with the prehensile structure of the tail to fit it for its arboreal residence. It may be observed that the animal possesses clavicles, which do not exist in the great ant-eater, the tamandua, nor yet in the pangolins. The eyes are small, the ears close and buried in the fur; the mouth is small, and the tongue long and vermiform. The fur is exquisitely fine, soft,

curled, and silky; the general colour is delicate golden straw, with a brownish mark on the back, often wanting. Length of head and body, ten inches; of the tail, ten inches and a half. (Fig. 142.)

The little ant-eater is a native of Guiana and Brazil, where it tenants the forests, suspending itself by its long tail, as well as clinging by means of its claws: it searches for insects among the fissures of the bark, and attacks the nests of wasps, the nymphæ of which it pulls out with its fore-claws or nippers, and eats them while it sits up like a squirrel. In defending themselves, these animals strike with both the fore-paws at once, and with considerable force. In their habits they are nocturnal, sleeping with the tail twisted round their perch. They utter no cry. The female is said to breed in the hollows of trees, making a bed of leaves, and producing one only at a birth. There is a pale variety, regarded by some as a distinct species.

Genus MANIS.

The American Ant-eaters are represented in India and Africa by the Pangolins, or Scaly Ant-eaters, which constitute the genus Manis of Linnæus. These singular animals may at once be known by the armour of dense horny scales, or triangular plates, overlapping each other, by which every part of the body, except the middle line of the under surface, is completely invested. The body is depressed, rounded above, long and low; the head is small and conical, the eyes are minute, there are no external ears, the mouth is small, and the tongue long and extensible; the tail is long and broad, and covered above and below with hard imbricated scales; the limbs are very short and thick, and mailed like the rest of the body; no distinct toes are apparent beyond the claws, which on the fore-feet are five in number, the three central ones being of enormous size, arched, thick, and bluntly pointed. The first and the last claw are very small. The large claws fold down on a thick coarse pad, as in the ant-eater, and the mode of progression in both cases is the same. The hind-feet have five short, thick,

143.—Temminck's Manis.

blunt claws, edging a pad-like sole covered with coarse granular skin, and so protuberant, that the claws do not fairly touch the ground. The ungual phalanges, or last joints of the toes (both of the fore and hind feet), which are sheathed by the claws, are remarkable for being bifurcated at their extremity, a peculiarity found in no other of the Edentata. It is evidently a conformation intended to give the claws a more secure attachment.

The osseous framework in general is moulded upon the same plan as that of the ant-eaters. Slow in their motions, and unfurnished with weapons of offence, the manis defies the assaults of almost every foe: when attacked, it rolls itself up into a ball, wraps its tail over the head, and raises all its pointed and sharp-edged scales in serried array, and, thus invulnerable, conquers by passive resistance. The food of the manis consists of termites and ants, which it takes in the same manner as the American ant-eaters. It dwells in holes which it burrows out in the ground.

perpendicular, and even inwardly inclined direction; so that the back of the skull appears abruptly truncate. The orbits are large, of a somewhat oval form, and obliquely situated. The outer ring is incomplete, excepting, as far as we ourselves have examined, in one species, the *Felis planiceps* of Sumatra, in which, as in the ichneumons, it is a fair circular ring; indeed, the skull of this species (of which we have only seen a single specimen) we considered as approaching in its contour to that of some of the Viverræ. The tympanic bulla, enclosing the internal organs of hearing, is largely developed. In the *Felis planiceps* it is of peculiar magnitude.

The bold ridges, and the strength and form of the zygomatic arches, indicate the immense volume and

Fig. 5.

Fig. 6.

stress of the muscles destined to act upon the lower jaw. The articulating condyles are not raised above the straight horizontal line carried along the sides of the lower jaw; they are cylindrical, and firmly locked in the transversely elongated glenoid cavities, the margins of which are so elevated before and behind as to render any but a simple hinge-like motion impossible. This scissor-like action of the lower jaw is in accordance with the trenchant character of the molar teeth, the mutual action of which on each other resembles that of the blades of a pair of shears. (Figures 5, 6, 7.)

The skulls of the Felidæ exhibit a general sameness of contour; the principal difference being that of size, according to the species. The ocelot has, perhaps, the most rounded skull, while that of the *Felis planiceps* is flattened between the orbits and narrow. Those of the lion and tiger are very similar, and not easy to be discriminated from each other. There is greater straightness in the longitudinal outline of the upper surface in that of the lion; greater flatness of the space between the orbits; and the infra-orbital foramina are larger and often double. The following character, first noticed

Fig. 7.

by Professor Owen, appears to be an unfailing criterion:—In the tiger, the nasal processes of the maxillary bones never extend upwards as far as the union of the nasal bones with the frontal, failing by the third of an inch; while in the lion, the nasal processes of the maxillary bones always attain the line of union between the nasal and frontal bones, and sometimes even pass beyond it.

In the limbs of the Felidæ we behold the finest display of muscular development which can be conceived. The dissected arm of a lion or tiger is a subject worthy the study of an artist. Hence to dash down their prey is an easy task. It has been said that the Bengal tiger has been known to fracture the skull of a man with one stroke of its heavy paw. We may easily conceive the force of the muscles destined to act on the claws or talons to which we have already alluded. There are five toes on the anterior, and four on the posterior extremities; and these are armed with the formidable weapons in question. By a beautiful structural conformation of the bones, ligaments, and muscular parts, they are always preserved without effort from coming in contact with the ground, and are retracted within a sheath, so as to be kept sharp and ready for service.

This involuntary retraction, counteracted only by the action of muscles, is effected by two elastic ligaments so contrived so as to roll back the ultimate

phalanx which the claw encases, and bring it down by the outer side of the penultimate phalanx, which is flattened off to remove every obstruction. From this position the talon can be thrown forward in a moment, the action of the double elastic spring being counteracted by that of the flexor muscles. In the act of striking with great violence, the flexor muscles strongly contract, brace up the tendon, and throw out the talon, which, when the act is over, returns to its sheath. An analogous arrangement exists in the claws of the sloth. Its hooks, as they may be termed, are governed by an elastic ligament, but its tendency, contrary to what we see in the cat tribe, is to press them towards the palm, in order to enable the animal to cling without fatigue to the branches from which it suspends itself. In Figure 8,

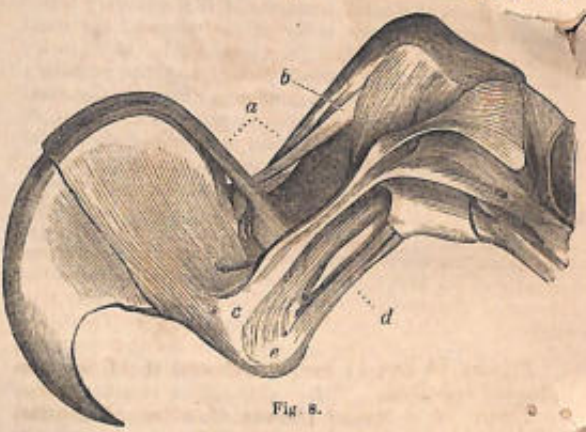


Fig. 8.

which is a toe from the left foot of a young lion represented in a state of extension, *a* points to the two elastic ligaments; *b* the tendon of the extensor muscle; *c* a slip of inelastic tendon; *d* the tendon of the flexor muscle which passes over the upper extremity of the last phalanx

at *e*, as over a pulley, and thus assists the powerful action of that muscle.

In Figure 9, a toe from the hind foot, the two elastic ligaments (*a*) converge to be inserted into the upper angle of the last phalanx, and draw it backwards upon, instead of by the side of, the penultimate phalanx. *c* is a slip of the lateral inelastic tendon, and *d* the tendon of the flexor profundus, which is strongly strapped down by an annular ligament *e*.

Fig. 9.

Figures 10 and 11 are also illustrative of the mechanism described.

Figure 10, *a* second phalanx of a toe; *b* the last phalangal bone: *c* an elastic ligament.

Figure 11, *a* and *b* the extremities of the two bones of the fore-arm; *c c* the carpal or wrist bones; *d d* the metacarpal bones; *e e* the first row of phalangal bones; *f f* the second row of phalangal bones; *g g* the last row encased with the claws.

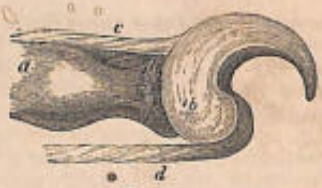


Fig. 10.

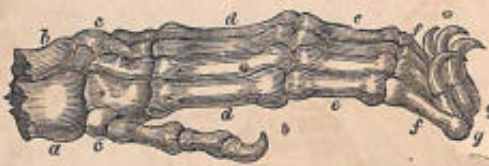


Fig. 11.

The general skeleton of the Felidæ, as exemplified by that of the lion (Figure 12), will claim a moment's notice.

The back and loins are long; the vertebræ of the neck are remarkably large and solid, the first or atlas having its lateral processes flat and expanded; the spinous processes of the dorsal vertebræ are long, with the exception of the last two or three; the transverse processes of the lumbar vertebræ are large; the spinous processes are broad, but rather short, and inclined gently forwards, but become, as they advance to those of the dorsal vertebræ, more upright, while, on the other hand, those of the dorsal in descending lose their obliquity; the chest is deep; the scapula is broad, with a high strong spine; the clavicle is small, and merely imbedded in the muscles of the shoulder; the humerus is short and stout; it is remarkable for a high ridge or crest, which rises above the outer condyle of its lower articulation. Above the inner condyle there is an orifice for the passage of the artery, which does not run round the bone, but, as it were, pierces it in a direct course onwards. This orifice is found not only in all the Felidæ, but in some of the

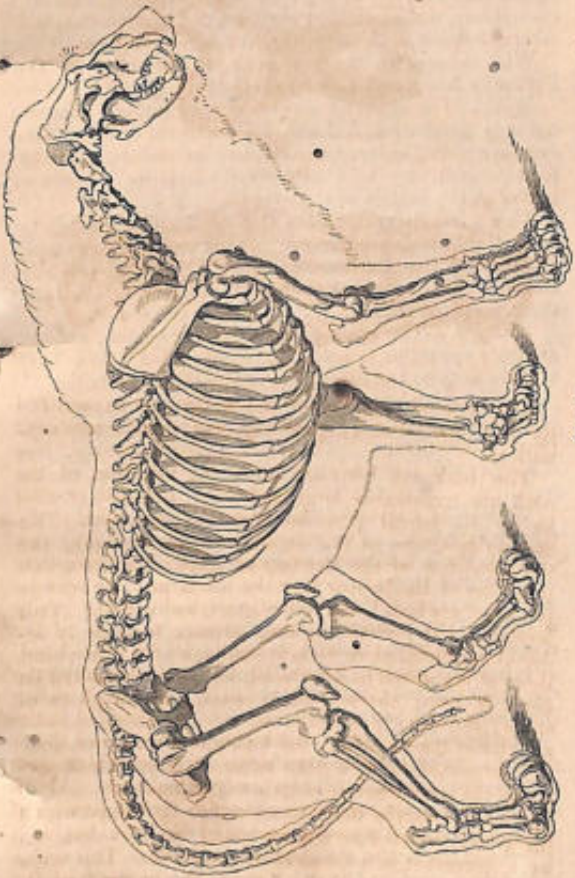


Fig. 13.

American monkeys, in the seals, the badgers, the coatis, the racoons, the mustelæ, the civets, the ichneumons, and others, but not in the dog, the hyæna, or the bear.

With respect to the perfection of the senses in the Felidæ, a few words may be necessary.

Sight.—The sense of sight is very acute, and adapted not only for diurnal, but also for nocturnal vision. The eyes are placed obliquely, and glare in the dark, owing to the brilliancy of the tapetum lucidum, a concave mirror at the bottom of the eye.

This glare is visible even during the day, especially when the animals are enraged, for the pupil dilates under excitement. In the smaller cats the pupil is vertically linear when contracted, but in the larger, as the lion, tiger, leopard, cheetah, jaguar, &c., it is circular.

Hearing.—The sense of hearing is exquisite, and the auditory apparatus is accordingly developed. We have already noticed the magnitude of the tympanic bulla.

Smell.—This sense is also in great perfection, and the olfactory apparatus is complicated, and abundantly supplied with nerves. The Felidæ are, however, less distinguished for the sense of smell than the canine race.

Taste.—The sense of taste is not very refined. The tongue is rough. The roughness of the tongue of the common cat is familiar to every one, as well as the action of lions and tigers in licking the bones of their prey in order to scrape off the adherent particles of flesh. This is effected by numerous horny papillæ, differently arranged in different species, but always with the points directed backwards. Figure 13 shows these papillæ on the lion's tongue; and Figure 14 a magnified view of them on a small portion.

Feeling.—The long bristles called *whiskers* on each side of a cat's mouth are familiar to all: these are important organs of touch. They are attached to a bed of close glands under the skin, and each is connected with a nerve. Hence they communicate to the animal an impression from the slightest touch. If we imagine a lion or tiger stealing through a jungle during the darkness

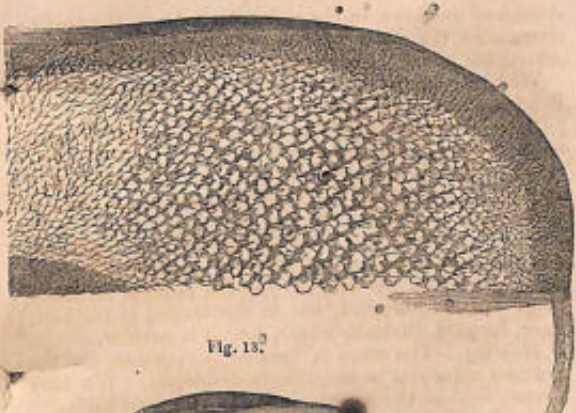


Fig. 13.

Fig. 14.

of night, we shall be able to account for the use of these whiskers. They indicate to him, through the nicest feeling, any obstacle which may present itself in his progress; they prevent him from rustling the leaves or boughs, and alarming his prey; and they thus, in conjunction with the soft springy pads of his feet, which render his steps noiseless, enable him to steal upon his unsuspecting victim, and make his fatal bound.

15.—African Lion. (Barbary.)

The Lion.

(*Felis Leo*, Linn.) Male, as a general rule, ornamented with a mane, of which the female is destitute.

The stern dignity of the lion, his enormous strength, his glowing eyes, his deep roar, and his destructive powers, all combine to render this terror of the desert one of the most attractive objects of a menagerie. Herodotus informs us that the camels which carried the

baggage of the army of Xerxes were attacked by them in the district of the Pæonians and Crestonæi, on their march from Acanthus to Therme (afterwards Thessalonia, now Saloniki): he adds also that these animals were numerous in the mountains between the river Nestus, in Thrace, and the Achelous, which flows through Acarnania. Aristotle gives the same locality as the abode of lions, and the same fact is repeated by Pliny, who says, "Longè viridibus præstantiores iis quos Africa aut Libya gignunt"—"They far exceed in strength those produced in Africa or Libya." Pausanias, alluding to the disasters which befel the baggage-camels of Xerxes, states that the lions often descended to the plain at the foot of Olympus, between Macedonia and Thessaly.

16.—Cape Lions.

17.—Bengal Lion, with Lioness.

Lions were common in Syria, as we gather from numerous passages in the Sacred records. Oppian states that Armenia and Parthia produced a formidable breed. At present the lion is confined to the interior wilds of Africa, to some of the districts of Arabia and Persia, to the country bordering the Euphrates, and to some parts of India. We hesitate not to say that throughout the whole of this range the lions are specifically identical, although different breeds may be distinguished. Of the African lions the Barbary breed is characterised by

18.—Persian Lion.

having a deep yellowish-brown fur, and the mane of the male is much developed. (Fig. 15.)

The Senegal lion has the fur of a more yellow tint, the mane is less full, and nearly wanting upon the breast and insides of the fore-legs.

The Cape lion presents two varieties, one yellowish, the other brown, the mane of the latter often deepening almost to black. The dark lion is said to be the most ferocious. (Fig. 16.)

Of the Asiatic breeds the Bengal lion has the mane

magnificently developed, the colour of the fur of a dark yellowish-brown. (Fig. 17.) It attains to a very large size. The Persian or Arabian lion is said to be characterised by the pale Isabella colour of the fur. (Fig. 18.)

Within the last few years a maneless, or nearly maneless, breed has been discovered in Guzerat. Pliny alludes to a maneless lion which he regarded as a hybrid occurring in Africa.

It is to Captain Smee that we owe our knowledge of the maneless lion. On his return from Guzerat to England he brought several skins of such lions which he

19.—Maneless Lion of Guzerat.

himself had shot; some of these he presented to the Zoological Society of London, and communicated an interesting paper to the 'Zoological Transactions' on the subject. The maneless lion of Guzerat differs from its Bengal, Persian, and African relatives, not only in the absence of a full mane, but also in being rather lower on the limbs, and in having a somewhat shorter tail, furnished at its tip with a larger brush. The colour is pale fulvous. A male killed by Captain Smee measured, including the tail, eight feet nine inches and a half; his weight, exclusive of the internal viscera, was thirty-five stone (fourteen pounds to the stone); his height three feet six inches; and the impression of his paw on the sand measured six and a half inches across. (Fig. 19.)

It is along the banks of the Sombermuttee, near Ahmedabad, according to Captain Smee, that this variety of the lion is found: it occurs also on the Rhun, near Rhunpor, and near Putton in Guzerat. "During the hot months they inhabit the low brushy-wooded plains that skirt the Bhardar and Sombermuttee rivers from Ahmedabad to the borders of Cutch, being driven out of the large adjoining tracts of high jungle called Bheers, by the practice annually resorted to by the natives of setting fire to the grass, in order to clear it and ensure a succession of young shoots for the cattle upon the first fall of the rains." So numerous are they, that Captain Smee killed in one district eleven in the course of a month. They make terrible havoc among the cattle, and when attacked exhibit great boldness. The native name for this lion is *Ontiah Baug*, or camel tiger, an appellation from the resemblance in colour to the camel.

The habits and manners of the lion have been detailed by various travellers, and no one can doubt its strength, its daring, and ferocity. Near the precincts of colonization in Southern Africa and elsewhere, where firearms are in use, it has learned by experience their fatal effects, and gained a consciousness that its powers avail but little against such weapons of destruction. If it is pursued, it turns and crouches, generally with its face to its adversary; and it is then that presence of mind and

firmness are most needed by the hunter. Mr. Burchell, in his 'Travels in South Africa,' gives an interesting account of his adventure with one of these animals :—

"The day was exceedingly pleasant, and not a cloud was to be seen. For a mile or two we travelled along the banks of the river, which in this part abounded in tall mat-rushes. The dogs seemed much to enjoy prowling about and examining every bushy place, and at last met with some object among the rushes which caused them to set up a most vehement and determined barking. We explored the spot with caution, as we suspected, from the peculiar tone of their bark, that it was what it proved to be, lions. Having encouraged the dogs to drive them out, a task which they performed with great willingness, we had a full view of an enormous black-maned lion, and a lioness. The latter was seen only for a minute, as she made her escape up the river, under concealment of the rushes; but *the lion* came steadily forward and stood still to look at us. At this moment we felt our situation not free from danger, as the animal seemed preparing to spring upon us, and we were standing on the bank at the distance of only a few yards from him, most of us being on foot and unarmed, without any visible possibility of escaping. I had given up my horse to the hunters, and was on foot myself, but there was no time for fear, and it was useless to attempt avoiding him. I stood well upon my guard, holding my pistols in my hand, with my finger upon the trigger, and those who had muskets kept themselves prepared in the same manner. But at this instant the dogs boldly flew in between us and the lion, and surrounding him, kept him at bay by their violent and resolute barking. The courage of these faithful animals was most admirable; they advanced up to the side of the huge beast, and stood making the greatest clamour in his face, without the least appearance of fear. The lion, conscious of his strength, remained unmoved at their noisy attempts, and kept his head turned towards us. At one moment, the dogs perceiving his eyes thus engaged, had advanced close to his feet, and seemed as if they would actually seize hold of him,

but they paid dearly for their imprudence; for, without discomposing the majestic and steady attitude in which he stood fixed, he merely moved his paw, and at the next instant I beheld two lying dead. In doing this, he made so little exertion that it was scarcely perceptible by what means they had been killed. Of the time which we had gained by the interference of the dogs, not a moment was lost; we fired upon him: one of the balls went through his side just between the short ribs, and the blood immediately began to flow, but the animal still remained standing in the same position. We had now no doubt that he would spring upon us; every gun was instantly re-loaded; but happily we were mistaken, and were not sorry to see him move quietly away; though I had hoped in a few minutes to have been enabled to take hold of his paw without danger.

"This was considered, by our party, to be a lion of the largest size, and seemed, as I measured him by comparison with the dogs, to be, though less bulky, as large as an ox. He was certainly as long in body, though lower in stature; and his copious mane gave him a truly formidable appearance. He was of that variety which the Hottentots and boors distinguish by the name of the *black lion*, on account of the blacker colour of the mane, and which is said to be always larger and more dangerous than the other, which they call the *pale lion* (vaal leeuw). Of the courage of a lion I have no very high opinion, but of his majestic air and movements, as exhibited by this animal, while at liberty in his native plains, I can bear testimony. Notwithstanding the pain of a wound, of which he must soon afterwards have died, he moved slowly away with a steady and measured step.

"At the time when men first adopted the lion as the emblem of courage, it would seem that they regarded great size and strength as indicating it; but they were greatly mistaken in the character they have given to this indolent, skulking animal, and have overlooked a much better example of true courage, and of other virtues also, in the bold and faithful dog."

However meanly Mr. Burchell may think of the

courage of the African lion, there is but little doubt that in an earlier state of colonization, and before the dread of fire-arms had become instinctive, they were far bolder than they are generally found now. One of the most remarkable examples of the audacity of a lion is to be found in the Journal of a Settler at the Cape, more than a century ago. The first settlement of the Dutch at Cape Town was in the year 1652: the site which they selected was on the southern edge of Table Bay, and the number of the settlers amounted only to a hundred persons. In half a century the colonists had greatly increased, and had driven the native Hottentots a considerable distance into the interior, amongst dry and barren tracts. This is the ordinary course of colonization. In 1705, the Landdrost, Jos. Sterreberg Kupt, proceeded on a journey into the country, to procure some young oxen for the Dutch East India Company;—and he has left a very interesting Journal of his expedition, which has been translated from the original Dutch, and published by the Rev. Dr. Philip, in his truly valuable 'Researches in South America.' The account which the Landdrost gives of the adventure of his company with a lion, is altogether so curious, that we extract it without abridgment:—

"Our waggons, which were obliged to take a circuitous route, arrived at last, and we pitched our tent a musket-shot from the kraal; and after having arranged everything, went to rest, but were soon disturbed: for about midnight the cattle and horses, which were standing between the waggons, began to start and run, and one of the drivers to shout, on which every one ran out of the tent with his gun. About thirty paces from the tent stood a lion, which, on seeing us, walked very deliberately about thirty paces farther, behind a small thorn-bush, carrying something with him, which I took to be a young ox. We fired more than sixty shots at that bush, and pierced it stoutly, without perceiving any movement. The south-east wind blew strong, the sky was clear, and the moon shone very bright, so that we could perceive everything at that distance. After the cattle had been

quieted again, and I had looked over everything, I missed the sentry from before the tent, Jan Smit, from Antwerp, belonging to the Groene Kloof. We called as loudly as possible, but in vain,—nobody answered; from which I concluded that the lion had carried him off. Three or four men then advanced very cautiously to the bush, which stood right opposite the door of the tent, to see if they could discover any thing of the man, but returned helter-skelter, for the lion, who was there still, rose up, and began to roar. They found there the musket of the sentry, which was cocked, and also his cap and shoes.

"We fired again about a hundred shots at the bush, (which was sixty paces from the tent and only thirty paces from the waggons, and at which we were able to point as at a target,) without perceiving anything of the lion, from which we concluded that he was killed or had run away. This induced the marksman, Jan Stamansz, to go and see if he was there still or not, taking with him a firebrand. But as soon as he approached the bush the lion roared terribly and leapt at him; on which he threw the firebrand at him, and the other people having fired about ten shots, he retired directly to his former place behind that bush.

"The firebrand which he had thrown at the lion had fallen in the midst of the bush, and, favoured by the strong south-east wind, it began to burn with a great flame, so that we could see very clearly into and through it. We continued our firing into it; the night passed away, and the day began to break, which animated every one to aim at the lion, because he could not go from thence without exposing himself entirely, as the bush stood directly against a steep kloof. Seven men, posted on the farthest waggons, watched him to take aim at him if he should come out.

"At last, before it became quite light, he walked up the hill with the man in his mouth, when about forty shots were fired at him without hitting him, although some were very near. Every time this happened he turned round towards the tent, and came roaring towards

us; and I am of opinion that if he had been hit, he would have rushed on the people and the tent.

"When it became broad day-light, we perceived, by the blood and a piece of the clothes of the man, that the lion had taken him away and carried him with him. We also found, behind the bush, the place where the lion had been keeping the man, and it appeared impossible that no ball should have hit him, as we found in that place several balls beaten flat. We concluded that he was wounded, and not far from this. The people therefore requested permission to go in search of the man's corpse in order to bury it, supposing that, by our continued firing, the lion would not have had time to devour much of it. I gave permission to some, on condition that they should take a good party of armed Hottentots with them, and made them promise that they would not run into danger, but keep a good look-out, and be circumspect. On this seven of them, assisted by forty-three armed Hottentots, followed the track, and found the lion about half a league farther on, lying behind a little bush. On the shout of the Hottentots, he sprang up and ran away, on which they all pursued him. At last the beast turned round, and rushed, roaring terribly, amongst the crowd. The people, fatigued and out of breath with their running, fired and missed him, on which he made directly towards them. The captain, or chief head of the kraal, here did a brave act in aid of two of the people whom the lion attacked. The gun of one of them missed fire, and the other missed his aim, on which the captain threw himself between the lion and the people so close, that the lion struck his claws into the caross (mantle) of the Hottentot. But he was too agile for him, doffed his caross, and stabbed him with an assagai. Instantly the other Hottentots hastened on, and adorned him with their assagais, so that he looked like a porcupine. Notwithstanding this he did not leave off roaring and leaping, and bit off some of the assagais, till the marksman Jan Stamansz fired a ball into his eye, which made him turn over, and he was then shot dead by the other people. He was a tremendously large beast, and had but a short

time before carried off a Hottentot from the kraal and devoured him."

In Southern Africa, within the bounds of the colony, and even sometimes beyond it, when the presence of a lion is manifested by the destruction of the domesticated animals, a "hunt" is undertaken. Of one of these hunts, Mr. Pringle, who was a settler on the eastern frontier of the Cape colony, and in 1822 was residing on his farm, or "location," at Bavian's River, has given the following vivid and most interesting narrative:—

"One night a lion, that had previously purloined a few sheep out of my kraal, came down and killed my riding horse, about a hundred yards from the door of my cabin. Knowing that the lion, when he does not carry off his prey, usually conceals himself in the vicinity, and is very apt to be dangerous by prowling about the place in search of more game, I resolved to have him destroyed or dislodged without delay. I therefore sent a messenger round the location, to invite all who were willing to assist in the enterprise, to repair to the place of rendezvous as speedily as possible. In an hour every man of the party (with the exception of two pluckless fellows who were kept at home by the women) appeared ready mounted and armed. We were also reinforced by about a dozen of the 'Bastaard' or Mulatto Hottentots, who resided at that time upon our territory as tenants or herdsmen—an active and enterprising, though rather an unsteady race of men. Our friends the Tarka boors, many of whom are excellent lion-hunters, were all too far distant to assist us—our nearest *neighbours* residing at least twenty miles from the location. We were, therefore, on account of our own inexperience, obliged to make our Hottentots the leaders of the chase.

"The first point was to track the lion to his covert. This was effected by a few of the Hottentots on foot. Commencing from the spot where the horse was killed, they followed the *spoor** through grass and gravel and brushwood, with astonishing ease and dexterity, where an inexperienced eye could discern neither footprint nor

* The Hottentot name for a footmark.

mark of any kind; until, at length, we fairly tracked him into a large *bosch*, or straggling thicket of brushwood and evergreens, about a mile distant.

"The next object was to drive him out of this retreat, in order to attack him in close phalanx, and with more safety and effect. The approved mode in such cases is to torment him with dogs till he abandons his covert, and stands at bay in the open plain. The whole band of hunters then march forward together, and fire deliberately, one by one. If he does not speedily fall, but grows angry and turns upon his enemies, they must then stand close in a circle, and turn their horses rear-outward; some holding them fast by the bridles, while the others kneel to take a steady aim at the lion as he approaches, sometimes up to the very horses' heels—couching every now and then, as if to measure the distance and strength of his enemies. This is the moment to shoot him fairly in the forehead, or some other mortal part. If they continue to wound him ineffectually till he waxes furious and desperate; or if the horses, startled by his terrific roar, grow frantic with terror, and burst loose, the business becomes rather serious, and may end in mischief—especially if all the party are not men of courage, coolness, and experience. The frontier boors are, however, generally such excellent marksmen, and withal so cool and deliberate, that they seldom fail to shoot him dead as soon as they get within a fair distance.

"In the present instance, we did not manage matters quite so scientifically. The Bastaards, after recounting to us all these and other sage laws of lion-hunting, were themselves the first to depart from them. Finding that the few indifferent hounds we had made little impression on the enemy, they divided themselves into two or three parties, and rode round the jungle, firing into the spot where the dogs were barking round him, but without effect. At length, after some hours spent in thus beating about the bush, the Scottish blood of some of my countrymen began to get impatient; and three of them announced their determination to march in and beard the lion in his den, provided three of the Bastaards (who were superior

marksmen) would support them, and follow up their fire, should the enemy venture to give battle. Accordingly, in they went (in spite of the warnings of some more prudent men among us) to within fifteen or twenty paces of the spot where the animal lay concealed. He was couched among the roots of a large evergreen bush, with a small space of open ground on one side of it; and they fancied, on approaching, that they saw him distinctly, lying glaring at them from under the foliage. Charging the Bastaards to stand firm and level fair should *they* miss, the Scottish champions let fly together, and struck—not the lion, as it afterwards proved, but a great block of red stone, beyond which he was actually lying. Whether any of the shot grazed him is uncertain, but, with no other warning than a furious growl, forth he bolted from the bush. The pusillanimous Bastaards, in place of now pouring in their volley upon him, instantly turned, and fled helter-skelter, leaving him to do his pleasure upon the defenceless Scots—who, with empty guns, were tumbling over each other, in their hurry to escape the clutch of the rampant savage. In a twinkling he was upon them, and with one stroke of his paw dashed the nearest to the ground. The scene was terrific! There stood the lion with his foot upon his prostrate foe, looking round in conscious power and pride upon the bands of his assailants—and with a port the most noble and imposing that can be conceived. It was the most magnificent thing I ever witnessed. The danger of our friends, however, rendered it at the moment too terrible to enjoy either the grand or the ludicrous part of the picture. We expected every instant to see one or more of them torn in pieces; nor, though the rest of the party were standing within fifty paces with their guns cocked and levelled, durst we fire for their assistance. One was lying under the lion's paw, and the other scrambling towards us in such a way as to intercept our aim at him. All this passed far more rapidly than I have described it. But luckily the lion, after steadily surveying us for a few seconds, seemed willing to be quits with us on fair terms; and with a fortunate forbearance, (for which he met with

but an ungrateful recompense,) turned calmly away, and driving the snarling dogs like rats from among his heels, bounded over the adjoining thicket like a cat over a foot-stool; clearing brakes and bushes twelve or fifteen feet high as readily as if they had been tufts of grass, and abandoning the jungle, retreated towards the mountains.

"After ascertaining the state of our rescued comrade, (who fortunately had sustained no other injury than a slight scratch on the back, and a severe bruise in the ribs, from the force with which the animal had dashed him to the ground,) we renewed the chase with Hottentots and hounds in full cry. In a short time we again came up with the enemy, and found him standing at bay under an old mimosa tree, by the side of a mountain-stream, which we had distinguished by the name of Douglas Water. The dogs were barking round, but afraid to approach him, for he was now beginning to growl fiercely, and to brandish his tail in a manner that showed he was meditating mischief. The Hottentots, by taking a circuit between him and the mountain, crossed the stream, and took a position on the top of a precipice overlooking the spot where he stood. Another party of us occupied a position on the other side of the glen; and placing the poor fellow thus between two fires, which confused his attention and prevented his retreat, we kept battering away at him, till he fell, unable again to grapple with us, pierced with many wounds.

"He proved to be a full-grown lion of the yellow variety, about five or six years of age. He measured nearly twelve feet from the nose to the tip of the tail. His foreleg below the knee was so thick that I could not span it with both hands; and his neck, breast, and limbs appeared, when the skin was taken off, a complete congeries of sinews."

The king of the forest is a term misapplied to this noble beast; forests are not his haunts, but burning desert plains and wide karroos covered only with shrubby vegetation or interspersed with tracts of low brushwood. In India it frequents the jungles and the luxuriant borders of rivers, among which it makes its lair.

During the day the lion usually slumbers in his retreat: as night sets in, he rouses from his lair and begins his prowl. The nocturnal tempests of rain and lightning, which in Southern Africa are of common occurrence, are to him seasons of joy: his voice mingles with the roar of the thunder, and adds to the confusion and terror of the timid beasts upon which he preys, and upon which he now advances with less caution and a bolder step. In general, however, he waits in ambush or creeps insidiously towards his victim, which with a bound and a roar he dashes to the earth.

Of the strength of the lion we have most extraordinary examples on record. To carry off a man—and

20.—Crippled Lion.

this has but too often happened—is a feat of no difficulty to this powerful brute. Indeed when we find that a Cape lion seized a heifer in his mouth, and though the legs dragged upon the ground, carried her off with apparently the same ease as a cat does a rat, leaping a broad dyke with her without the least difficulty—that another, and a young one too, conveyed a horse about a mile from the spot where he had killed it—that a third, which had carried off a two-year-old heifer, was followed on the track for five hours by horsemen, who observed that throughout the whole distance the carcass of the heifer had only once or twice touched the ground,—we

may conceive that a man would be an insignificant burden. Such a powerful animal, however, we must not expect to see in the confined dens of a menagerie: there their limbs become cramped, their muscular system undeveloped, their bones often distorted, and their daring and ferocity subdued. Such a shadow of a lion Figure 20 exhibits, taken from an individual three years old, which had been pent up in a wretched cage.

The Indian lion displays the same courage as its African relative. Instead of retreating on the hunters' approach, he stands his ground, or rushes to meet them open-mouthed on the plain. Lions are thus easily shot; but if they be missed or only slightly wounded, they prove very formidable. They will spring on the heads of the largest elephants, and have, it is asserted, often pulled them to the earth, riders and all.

In the defence of her cubs the lioness is resolute in the extreme, and is doubly savage during the time they remain under her care. Her mate participates in her feelings. The lioness goes with young five months, and generally produces from two to four young at a birth. They are born blind. For several months their fur is obscurely striped, or brindled, the markings reminding us of those of the tiger: these stripes branch off from a blackish line running down the middle of the back. Their voice is a cat-like mew. Gradually the uniform colour is assumed, and at about the end of twelve months the mane begins to appear: this increases, and the voice deepens into a roar.

The lion attains to maturity about the fifth year: its term of life is of considerable extent. Pompey, which died in the Tower in 1760, had been there for seventy years, and one from the Gambia died there at the age of sixty-three.

It has long been a popular belief that the lion lashes himself with his tail to stimulate himself into a rage; and though such a use for it is out of the question, a sort of claw or prickle has been detected at the termination of that organ. Mr Bennett detected it in the tip of the tail of a young Barbary lion. Blumenbach had

previously ascertained the fact of its existence in a specimen examined by himself in 1829. M. Deshayes announced the existence of this prickle in a lion and lioness which died in Paris menagerie. Mr. Woods detected it only once out of numerous lions which he purposely examined; he also found a similar prickle on the tip of the tail of an Asiatic leopard.

This prickle is in fact only occasionally present; it is not connected with the caudal vertebræ, but, as Mr. Woods states, appears to be inserted into the skin like the bulb of a bristle; but M. Deshayes asserts that it is of a conical shape, and adheres to the skin by its base; as does also Blumenbach. (Fig. 21.) We are much inclined to think it nothing more than an indurated and partially detached cuticle; certainly it falls off with the slightest touch.

Fig. 21.

Hybrids between the lion and tigress (Fig. 22) have occurred in our country. One litter was produced about 1824 in Atkins' menagerie, and another litter subsequently from similar parents was produced at Windsor. Of the first litter, one lived till 1842; all the others died before arriving at maturity. Their colour was brighter than that of true lion-cubs, and the bands more defined and darker.

Excepting in the vast wilds of Central Africa, untrodden by the foot of the white man, the lion, even in the regions to which it is at present restricted, is much

22.—Lion-Tiger Cubs.

more rare than formerly. The ancient Romans procured incredible multitudes for the arena: Sylla brought a hundred males at once into the combat; Pompey gave six hundred, of which more than half were males; Cæsar four hundred; nor was it until the time of the later emperors that any difficulty in procuring them began to be experienced.

There are few travellers in Africa who have not been under the necessity of encountering this formidable beast. And many are the exciting narratives which have been related, of the incidents of the chase—of escape from almost certain death—of triumph over the foe.

The bushmen of Southern Africa, according to Dr. Philip, are in the habit of insidiously attacking the slumbering lion with their poisoned arrows. They have remarked that he generally kills and devours his prey in the morning at sunrise or in the evening at sunset; that he sleeps during the heat of the day so profoundly as with difficulty to be awakened; and that when roused, he seems to lose all presence of mind. Marking the spot where a lion is supposed to have taken up his quarters for sleep, they cautiously advance, and

silently lodge a poisoned arrow in his breast. The lion, thus struck, springs from his lair and bounds off; but the work is done, and the bushmen follow his track, knowing that in a few hours, or less, he will expire.

The Tiger.

Tigre Royal, Buffon's *Nat. Hist.*; *Felis Tigris*, Linn.

23.—Royal Tiger.

The Royal Tiger (Fig. 23), as it is often called to distinguish it from the smaller tiger-cats, is far more limited in its range than the lion. It is exclusively Asiatic. Hindustan may be considered as its head-quarters, but it is common in the larger islands, as Sumatra, where it is a fearful scourge. It is said to occur in the south of China, and also in the deserts which separate China from Siberia, and as far as the banks of the Oby. It is found in Tonquin and Siam.

The ancients regarded India and Hyrcania as nurseries of the tiger. Hyrcania was a province of the ancient Persian empire, at the south-eastern corner of the Caspian Sea; but its boundaries are not very determinate. Whether the tiger still inhabits this district is not very clear; there is no reason, however, to doubt the concurrent testimonies of the ancient writers.

The tiger is equal in size to the lion, but of a more elongated form, and pre-eminently graceful. The head also is shorter and more rounded. Occasionally individuals occur exceeding any lion we have contemplated in menageries; but the average height is from three feet six inches to four feet. The general tint of the fur is of a fine yellow or reddish-yellow, ornamented by a series of transverse black bands or stripes, which occupy the sides of the head, neck, and body, and are continued on the tail in the form of rings: the under parts of the body and inner parts of the limbs are almost white. Individuals are sometimes exhibited of a very pale colour, with the stripes very obscure, and Du Halde says that the Chinese tiger (Lou-chu or Lau-hu) varies in colour, some being white, striped with black and gray.

The ancients make frequent mention of the tiger, with which it cannot be doubted that Aristotle was well acquainted, though he talks of a breed in India between this animal and the dog, meaning perhaps the cheetah, which is used for the chase. Pliny describes the "tremendous velocity" of the tiger, and the devoted attachment of the tigress to her young. Oppian speaks of swift tigers, the offspring of the zephyr; and of its swiftness Mr. Bell the traveller, and Père Gerbillon, were witnesses in China, the chase of this animal being a favourite diversion with the great Cam-Hi, the Chinese monarch. It appears that Augustus was the first who exhibited a tiger at Rome, which was tame and kept in a cage. Claudius afterwards exhibited four, and Cuvier suggests that it was in commemoration of this rare spectacle that the mosaic, discovered some years since at Rome, was made, representing four royal tigers in

the act of devouring their prey. As, however, India and its products became better known to the Romans, the tiger became more familiar to them, but was never exhibited in great numbers. Ten were in the possession of Gordian III.

Active, powerful, and ferocious, the tiger is more to be dreaded than the lion, because it is more insidious in its attack, and also prowls abroad by day as well as by night. In some districts of India and in Sumatra its ravages are frightful. We are informed by Col. Sykes that in the province of Kandeish alone one thousand and thirty-two tigers were killed from the year 1825 to 1829 inclusive, according to the official returns. In Sumatra the infatuated natives seldom attempt their destruction, having a notion that they are animated by the souls of their ancestors. Tiger-hunting is one of the favourite field-sports of the East, and as the chase is not unattended with danger it is productive of proportionate excitement. Though horsemen as well as persons on foot attend on these occasions, it is more for the sake of "being in at the death" than of taking a decided part, for the horse will seldom stand steadily when near this dreaded beast. It is to the armed riders on elephants that the dangerous work of rousing up the tiger from the jungle covert is left, and of firing at him as he bounds along. The tiger's first object is to escape under the covert of the long grass or jungle; but, when wounded or hard pressed, he will turn with great fury, and by springing on the elephant's head or shoulder endeavour to reach his antagonists. The agitation of the elephants, which often lose all obedience to control at such a moment, together with the rapidity of the attack, renders this a critical juncture, and fatal accidents have often embittered the conclusion of the contest.

Bishop Heber, in his 'Journal,' has given a lively narrative of the mode in which a tiger-hunt is conducted:—"At Kulleanpoor, the young Raja, Gourman Singh, mentioned, in the course of conversation, that there was a tiger in an adjoining tope, which had done a good deal of mischief; that he should have gone after it himself,

had he not been ill, and had he not thought it would be a fine diversion for Mr. Boulderson, the collector of the district, and me. I told him I was no sportsman; but Mr. Boulderson's eyes sparkled at the name of tiger, and he expressed great anxiety to beat up his quarters in the afternoon. Under such circumstances, I did not like to deprive him of his sport, as he would not leave me by myself, and went, though with no intention of being more than a spectator. Mr. Boulderson, however, advised me to load my pistols for the sake of defence, and lent me a very fine double-barrelled gun for the same purpose. We set out a little after three on our elephants, with a servant behind each howdah, carrying a large chatta, which, however, was almost needless. The Raja, in spite of his fever, made his appearance too, saying that he could not bear to be left behind. A number of people, on foot and horseback, attended from our own camp and the neighbouring villages, and the same sort of interest and delight was evidently excited which might be produced in England by a great coursing party. The Raja was on a little female elephant, hardly bigger than the Durham ox, and almost as shaggy as a poodle. She was a native of the neighbouring wood, where they are generally, though not always, of a smaller size than those of Bengal and Chittagong. He sat in a low howdah,* with two or three guns ranged beside him, ready for action. Mr. Boulderson had also a formidable apparatus of muskets and fowling-pieces, projecting over his mohout's head. We rode about two miles across a plain covered with long jungly grass, which very much put me in mind of the country near the Cuban. Quails and wild-fowl arose in great numbers, and beautiful antelopes were seen scudding away in all directions."

The Bishop then describes the beating of the jungle, the rushing out of two curious animals of the elk kind, called the "mohr," and the growing anxiety of all the people engaged in the hunt. He then proceeds thus:—

* The howdah is a seat somewhat resembling the body of a gig, and is fastened by girths to the back of the elephant.

"At last the elephants all drew up their trunks into the air, began to roar, and stamp violently with their fore-feet. The Raja's little elephant turned short round, and in spite of all her mohout (her driver) could say or do, took up her post, to the Raja's great annoyance, close in the rear of Mr. Boulderson. The other three (for one of my baggage elephants had come out too, the mohout, though unarmed, not caring to miss the show) went on slowly, but boldly, with their trunks raised, their ears expanded, and their sagacious little eyes bent intently forward. 'We are close upon him,' said Mr. Boulderson; 'fire where you see the long grass shake, if he rises before you.' Just at that moment my elephant stamped again violently. 'There, there,' cried the mohout, 'I saw his head.' A short roar, or rather loud growl, followed, and I saw immediately before my elephant's head the motion of some large animal stealing through the grass. I fired as directed, and a moment after, seeing the motion still more plainly, fired the second barrel. Another short growl followed; the motion was immediately quickened, and was soon lost in the more distant jungle. Mr. Boulderson said, 'I should not wonder if you hit him that last time; at any rate, we shall drive him out of the cover, and then I will take care of him.' In fact at that moment the crowd of horse and foot spectators at the jungle side began to run off in all directions. We went on to the place, but found it was a false alarm; and, in fact, we had seen all we were to see of him, and went twice more through the jungle in vain. . . . . .

"I asked Mr. Boulderson, on our return, whether tiger-hunting was generally of this kind, which I could not help comparing to that chase of bubbles which enables us in England to pursue an otter. In a jungle, he answered, it must always be pretty much the same, inasmuch as, except under very peculiar circumstances, or when a tiger felt himself severely wounded, and was roused to revenge by despair, his aim was to remain concealed, and to make of as quietly as possible. It was after he had broken cover, or when he found himself in a situation so as to be fairly at bay, that the serious part of the

sport began, in which case he attacked his enemies boldly, and always died fighting. He added, that the lion, though not so large or swift an animal as the tiger, was generally stronger and more courageous. Those which have been killed in India, instead of running away when pursued through a jungle, seldom seem to think its cover necessary at all. When they see their enemies approaching, they spring out to meet them, open-mouthed, in the plain, like the boldest of all animals, a mastiff dog. They are thus generally shot with very little trouble; but if they are missed, or only slightly wounded, they are truly formidable enemies. Though not swift, they leap with vast strength and violence; and their large heads, immense paws, and the great weight of their body forwards, often enable them to spring on the head of the largest elephants, and fairly pull them down to the ground, riders and all. When a tiger springs on an elephant, the latter is generally able to shake him off under his feet, and then woe be to him. The elephant either kneels on him and crushes him at once, or gives him a kick which breaks half his ribs, and sends him flying perhaps twenty paces. The elephants, however, are often dreadfully torn; and a large old tiger sometimes clings too fast to be thus dealt with. In this case it often happens that the elephant himself falls, from pain, or from the hope of rolling on his enemy; and the people on his back are in very considerable danger, both from friends and foes, for Mr. Boulderson said the scratch of a tiger was sometimes venomous, as that of a cat is said to be. But this did not often happen; and in general, persons wounded by his teeth or claws, if not killed outright, recovered easily enough."

Instances are on record in which men have been carried off by tigers while travelling in company with others. The fate of Sir Hector Monro's son, who was carried off out of the midst of a party refreshing themselves on the edge of a jungle, December, 1792, in Saugur Island, is known to all. Similar instances are related.

Tigers are destroyed by various devices—pitfalls,

traps, the spear, and gun. The plan of the box-trap and looking-glass for taking tigers, leopards, &c., a device to be found in ancient sculpture, according to Montfaucon, is said to be practised by the Chinese at the present day. Fig. 24 refers to this kind of trap.

24.—Leopard-catching.

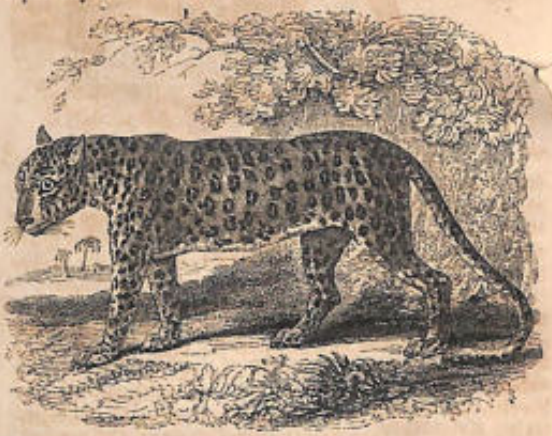
Those who have represented the tiger as untameable have no ground for the assertion. It is as capable of being tamed, and of attachment to its keeper, as any other animal of its kind. Yet with the tiger, the lion, and others of the race, caution should be used. Their natural disposition is ever ready to break out, and the mildest will, however tame they be, often show "the wild trick of their ancestors."

Neither the tiger nor the lion is capable of climbing trees, as are most of the lighter of the feline race: their prey is therefore exclusively confined to antelopes, deer, oxen, horses, and the like; while monkeys, and even birds, are among the prey of the leopard, the panther, and the smaller Felidæ.

The Leopard, Panther, and Ounce.

The leopard (*Felis Leopardus*), the panther (*Felis Pardus*), and the ounce of Buffon (*Felis Uncia*), have been by many naturalists confounded together, and even with the jaguar of the American continent. With re-

spect to the leopard and panther there are great difficulties in coming to a determination whether they are distinct species or not. In both we observe rosettes, or spots arranged in rose-form, on a fine yellow ground; but in the size and minor arrangement of these rosettes there is the greatest variation. Major H. Smith defines the leopard as differing from the panther in being of a paler yellowish colour, of rather smaller size, and with the dots rose-formed, consisting of several dots partially united into a circular figure in some instances, and into a quadrangular, triangular, or other less determinate form, in others; having also isolated black spots, especially about the outside of the limbs. (Fig. 25.)



25.—Leopard.

In the panther the open spots have the central space darker than the general colour of the sides. The subject is still open for investigation.

Both these beautiful creatures are widely spread in the Old World, being natives of Africa, India, and the Indian Islands, as Ceylon, Sumatra, &c. &c. In Java a

26.—Black Panther.

black variety (*Felis melas*) is not uncommon, and such are occasionally seen in our menageries; they are deeper than the general tint, and show in certain lights only. (Fig. 26.) A black cub, it is said, occasionally occurs in the same nest with others of the ordinary colours.

Nothing can exceed the grace and activity of these animals: they bound with astonishing ease, climb trees, and swim, and the flexibility of the body enables them to creep along the ground with the cautious silence of a snake on their unsuspecting prey. In India the leopard is called by the natives the Tree Tiger, from its generally taking refuge when pursued in a tree, and also from being often seen among the branches: so quick and active is the animal in this situation, that it is not easy to take a fair aim at him.

Antelopes, deer, small quadrupeds, and monkeys are its prey. It seldom attacks a man voluntarily, but if provoked becomes a formidable assailant. Like the other Felidæ, the habits of the leopard are compounded

of ferocity and cunning. A gentleman in the civil service at Ceylon has given the following description of an encounter with a leopard or panther, which throughout India are commonly called tigers:—"I was at Jaffna, at the northern extremity of the island of Ceylon, in the beginning of the year 1819; when, one morning, my servant called me an hour or two before my usual time, with 'Master, master! people sent for master's dogs—tiger in the town!' Now, my dogs chanced to be some very degenerate specimens of a fine species, called the Poligar dog, which I should designate as a sort of wiry-haired greyhound, without scent. I kept them to hunt jackals; but tigers are very different things: by the way, there are no real tigers in Ceylon; but leopards and panthers are always called so, and by ourselves as well as by the natives. This turned out to be a panther. My gun chanced not to be put together; and while my servant was doing it, the collector, and two medical men, who had recently arrived, in consequence of the cholera morbus having just then reached Ceylon from the continent, came to my door, the former armed with a fowling-piece, and the two latter with remarkably blunt hog-spears. They insisted upon setting off without waiting for my gun, a proceeding not much to my taste. The tiger (I must continue to call him so) had taken refuge in a hut, the roof of which, as those of Ceylon huts in general, spread to the ground like an umbrella; the only aperture into it was a small door, about four feet high. The collector wanted to get the tiger out at once. I begged to wait for my gun; but no—the fowling-piece (loaded with ball, of course) and the two hog-spears were quite enough. I got a hedge-stake, and awaited my fate, from very shame. At this moment, to my great delight, there arrived from the fort an English officer, two artillery-men, and a Malay captain; and a pretty figure we should have cut without them, as the event will show. I was now quite ready to attack, and my gun came a minute afterwards. The whole scene which follows took place within an enclosure, about twenty feet square, formed, on three sides, by a strong

fence of palmyra leaves, and on the fourth by the hut. At the door of this the two artillery-men planted themselves; and the Malay captain got at the top, to frighten the tiger out, by unroofing it—an easy operation, as the huts there are covered with cocoa-nut leaves. One of the artillery-men wanted to go in to the tiger, but we would not suffer it. At last the beast sprang; this man received him on his bayonet, which he thrust apparently down his throat, firing his piece at the same moment. The bayonet broke off short, leaving less than three inches on the musket; the rest remained in the animal, but was invisible to us: the shot probably went through his cheek, for it certainly did not seriously injure him, as he instantly rose upon his legs, with a loud roar, and placed his paws upon the soldier's breast. At this moment, the animal appeared to me to about reach the centre of the man's face; but I had scarcely time to observe this, when the tiger, stooping his head, seized the soldier's arm in his mouth, turned him half round, staggering, threw him over on his back, and fell upon him. Our dread now was, that if we fired upon the tiger, we might kill the man: for a moment there was a pause, when his comrade attacked the beast exactly in the same manner as the gallant fellow himself had done. He struck his bayonet into his head; the tiger rose at him—he fired; and this time the ball took effect, and in the head. The animal staggered backwards, and we all poured in our fire. He still kicked and writhed; when the gentlemen with the hog-spears advanced, and fixed him, while some natives finished him, by beating him on the head with hedge-stakes. The brave artillery-man was, after all, but slightly hurt: he claimed the skin, which was very cheerfully given to him. There was, however, a cry among the natives that the head should be cut off: it was, and in so doing, the knife came directly across the bayonet. The animal measured scarcely less than four feet from the root of the tail to the muzzle. There was no tradition of a tiger having been in Jaffna before; indeed, this one must have either come a distance of almost twenty miles, or have swum across

27.—Leopard. (Senegal.)

an arm of the sea nearly two in breadth; for Jaffna stands on a peninsula on which there is no jungle of any magnitude."

The leopard is taken in pitfalls and traps. In some old writers there are accounts of the leopard being taken in a trap by means of a mirror, which, when the animal jumps against it, brings the door down upon him. (Fig. 24.) This story may have received some sanction from the disposition of the domestic cat, when young, to survey her figure in a looking-glass.

The leopard and panther are easily tamed, and become

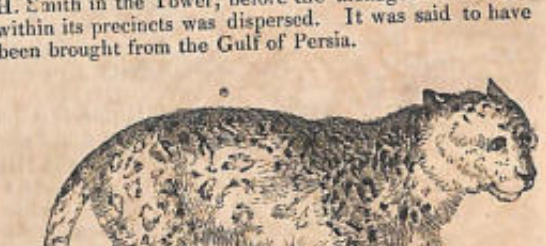
gentle and affectionate, purring when pleased, and rubbing their sides against the bars of their cage, or against their keeper, like a cat. When at play they bound around their enclosure with the agility of a squirrel, and so quick that the eye can scarcely follow their movements. From such an exhibition we may easily form some idea of their agile movements in a state of nature. (Fig. 27.)

In Loudon's 'Magazine of Natural History' is an account, by Mrs. Bowdich, of a tame leopard which she had in her possession. She won the affections of the creature by presenting him with lavender-water on a tray-card. The animal revelled in the delicious essence almost to extasy. We know the fondness of the common cat for mint, valerian, and other aromatic herbs, on which they delight to roll. The leopard stands about two feet in height: its figure is slim and graceful, but vigorous, and its proportions admirable.

The ounce (*Once*, Buffon), *Felis Uncia*. Whatever may be the specific distinction between the leopard and panther, no one can hesitate as to the ounce, figured by Buffon, and after him by Bewick ('Quadrupeds').* Till recently, however, it was confounded with one or both of the above animals, but it is most decidedly a different species. Our figure (28) is taken from a specimen in the British Museum, which in 1837 Mr Gray brought before the notice of a scientific meeting of the Zoological Society of London. It formed part of a collection made by the late Colonel Cobb in India. The fur is full and long, indicating most probably a mountain residence rather than the sultry plains. The general colour is gray or whitish-gray, tinged with yellow, lighter on the breast and under parts. The head is marked on the top with black spots, a large one being behind the ears. The body and sides of the limbs are variegated with irregular wavy marks, forming rounded or rather oval figures, but not definitely nor so orderly arranged as

* The concluding part of Bewick's details refers to the cheetah, which he elsewhere notices, but not by its name.

in the leopard. The tail, which is very long, is almost bushy, especially at its termination, the hair being very full. An individual of this species was seen by Colonel H. Smith in the Tower, before the menagerie contained within its precincts was dispersed. It was said to have been brought from the Gulf of Persia.



28.—Ounce.

THE RIMAU-DAHAN. (*Felis macrocelis*, Temm.)

This beautiful species is a native of Sumatra, where it was discovered by the late Sir Stamford Raffles, who brought a young specimen alive to England, where it died soon after its arrival. (Fig. 29.) A larger and older individual was lost in the Fame. Respecting these individuals, Sir S. Raffles remarks that they were, while in confinement, remarkable for good-temper and playfulness; no domestic kitten could be more so: they courted the notice of persons, throwing themselves on their backs, and delighting to be fondled.

With a small dog that was on board, the rimau-dahan used to play and gambol, at the same time acting with great gentleness. He never seemed to look on men or

29.—Rimau-Dahan.

children as prey, but as companions, and the natives assert that when wild they live principally on poultry, birds, and the smaller kinds of deer. They are not found in numbers, and may be considered as rather rare even in Sumatra: they are found in the interior of Bencoolen, on the banks of the Bencoolen river, and frequent the vicinity of villages, not being dreaded, except for their propensity to destroy poultry. The natives assert that they sleep and often lie in wait for their prey in trees, and from this circumstance they derive the name of dahan, which signifies the fork formed by the branch of a tree, across which

they are said to rest and occasionally stretch themselves. The rimau-dahan is, when adult, larger than the leopard, and is remarkable for the thickness and strength of its limbs and paws, but the contour of its body is very graceful. The head is small, and the physiognomy less expressive of ferocity than that of the tiger or leopard. The tail is extremely long and thickly covered with fine full fur, as indeed is the body also. The general ground-colour is brownish-gray, on which are dispersed streaks and marbled markings of black of an irregular form, and more or less angular. Two longitudinal bands pass along the spine; a band stretches from each ear down the side of the neck, and two obliquely traverse each side of the face. The large marbled markings have an abrupt edge behind, and the black has the appearance of velvet.

An allied but much smaller species, from the Indian Islands, will be found described in the 'Proceedings of the Zoological Society of London' for 1836, p. 107, under the title of Felis Marmorata.

The Nepaul Tiger-Cat. (*Felis Nepalensis.*)

This is a slender species, measuring about one foot ten inches in the length of the head and body, that of the tail being ten and a half inches. (Fig. 30.) Its distinguishing characters are its lengthened contour and the slenderness and proportional length of the tail. The ground is tawny-gray, passing into white on the throat and under parts; longitudinal marks of a deep black run down the back, and broad irregular dashes of the same colour ornament the sides, flanks, and outer surface of the limbs; the under parts are marked with oval spots, the thighs externally with rounded spots; the tail above, excepting at the extremity, spotted; the cheeks streaked with two black lines, and a transverse lunar mark passes round the angle of the mouth, while a narrow band is continued across the throat. An individual of this species was formerly living in the gardens of the Zoological Society, London. It was extremely savage and wild:

it generally sat up like a domestic cat, and never paced its den, as do most of the feline animals. It is stated to have come originally from Nepaul, whence it was sent to Calcutta, and thence brought to England.

30.—Nepaul Tiger-cat.

The Serval. (*Felis Serval.*)

The serval is a native of southern Africa, and is not uncommon in menageries; specimens are living in the gardens of the Zoological Society of London. (Fig. 31.) It is frequently very tame and playful, gambolling like a kitten, and enduring captivity without sullenness or a display of ferocity. The disposition of the feline race greatly depends on the treatment they experience, so that, while some are savage and distrustful, others of the same species are familiar. Some species, however, are more easily reclaimed than others, and of these we may count the serval.

The serval stands about eighteen inches in height at the shoulders: the length of the head and body is thirty-four inches, that of the tail ten inches.

The upper parts are of a clear yellowish-white with black spots: the lower parts are white, spotted more

distantly with black. Symmetrical lines adorn the head and neck, directed towards the shoulders. The back of the ears is black at the base, then barred transversely with white, and tipped with yellow: on the inside of the fore-limbs are two black bars. Tail ringed with black.

The general form is slender, and the limbs are thin; the head is long, compressed, and viverrine in its character; the ears are large and broad, and their bases nearly meet each other on the top of the head, giving a singular expression to the physiognomy. In some specimens the markings are more decided than in others. Our measurements are taken from one of five specimens in the Museum at Paris.

31.—Serval.

THE CHEETAH. (*Felis jubata.*)

This elegant animal, the cheetah, or hunting leopard, is spread extensively throughout Africa and India. Mr. Bennett observes that "Chardin, Bernier, Tavernier,

and others of the older travellers, had related that in several parts of Asia it was customary to make use of a large spotted cat in the pursuit of game, and that this animal was called Youze in Persia, and Cheetah in India; but the statements of these writers were so imperfect, and the descriptions given by them so incomplete, that it was next to impossible to recognise the particular species intended. We now, however, know with certainty that the animal thus employed is the *Felis jubata* of naturalists, which inhabits the greater part both of Asia and Africa. It is common in India and Sumatra, as well as in Persia, and is well known both in Senegal and at the Cape of Good Hope; but the ingenuity of the savage natives of the latter countries has not, so far as we know, been exerted in rendering its services available in the chase in the manner so successfully practised by the more refined and civilised inhabitants of Persia and Hindostan."

The cheetah differs in one or two points from the more typical of its race. The Felidæ in general possess a broad rounded paw, armed with sharp-hooked and completely retractile claws, which are protruded at pleasure; but in the cheetah the foot is long and narrow, and more like that of a dog, while the claws, from the laxity of the spring-ligaments, are very partially retracted, and are consequently worn and blunted at the points. As large in the body as the leopard, the cheetah is superior to that animal in height, and differs from it also in general figure. In the first place, the limbs, unadapted for climbing, are long, slender, and tapering; and the body, which is deficient in breadth, reminds one in some degree of that of the greyhound. (Fig. 32.) In consequence of these differences, Wagler separated it into a distinct genus, under the title of *Cynailurus*, in allusion to its intermediate station between the canine and feline races. The African cheetah has been by some regarded as a distinct species from that of India, under the supposition that the thin mane which covers the back of the neck was characteristic only of the African animal. Under this impression, the term *jubata* (maned) was restricted to

32.—Cheetah.

the African, and the term *venatica* (hunting) given to the Indian, cheetah. This is, however, altogether erroneous. In India the wild animal has a rough coat in which the mane is marked; but domesticated animals from the same part of the country are destitute of a mane, and have a smooth coat. The general colour of the cheetah is fawn yellow, covered with round black spots; a distinct black stripe passes from the inner angle of the eye to the angle of the mouth. The tip of the nose is black. The profile of the forehead and face is convex; the eye is peculiarly large, fine, and expressive; the pupils are circular; the tail is long, and curled up at its extremity, which is white; the fur is not sleek, but rather crisp. The skin of the cheetah is an article of

some importance in trade at Senegal, but is neglected at the Cape of Good Hope: this animal, called Luipard by the Dutch colonists, is indeed rare in that district, but the skin is occasionally seen worn by Kaffir chiefs, by way of distinction. In Africa the rude natives never dream of employing the cheetah as a means of procuring food,—they know not its value in the chase. In Persia and India it has, however, been employed from an early period. In the 'Field-Sports of India,' the mode of coursing with the cheetah is thus described:—"They (the cheetahs) are led out in chains, with blinds over their eyes, and sometimes carried out in carts; and when antelopes or deer, are seen on a plain, should any of them be separated from the rest, the cheetah's head is brought to face it, the blinds are removed, and the chain is taken off. He immediately crouches (Fig. 32*), and creeps along with his belly almost touching the ground, until he gets within a short distance of the deer, who, although seeing him approach, appears so fascinated, that he seldom attempts to run away. The cheetah then makes a few surprising springs, and seizes the deer by the neck. If many deer are near each other, they often escape by flight; their number, perhaps, giving them confidence."

We may add to this, that the cheetah takes advantage of every means of making its attack, and that, when unsuccessful in its effort, it returns sullenly to its keeper, who replaces the hood, and reserves him for another opportunity. When, however, he has grappled with the quarry and fixed himself upon its throat, drinking the life-blood warm, his nature breaks out in all its violence, so that it requires some management to separate him from his victim. Partly awed by the keeper's voice, partly enticed by pieces of meat, and a ladleful of the blood, he is induced to relinquish the prize, and submit to be again hooded. In all this we are reminded of the art of falconry.

In captivity the cheetah is familiar, gentle, and playful; and becomes greatly attached to those who feed or notice it. The general disposition of these beautiful creatures is, indeed, frank and confiding; and conse-

39*.—Cheetah.

quently there is little trouble in rendering them perfectly domestic. Their voice of pleasure is a *purr*; of uneasiness or hunger, a short reiterated *mew*.

The Wild Cat. (*Felis Catus.*)

This cat is the Chat Sauvage of the French, Gato Montes of the Spaniards, Wilde Katze and Baumritter of the Germans, Vild Kat of the Danes, Cathgoed of the ancient Britons, and *Catus sylvestris* of Klein. This species, which yet exists in the mountainous and wooded districts of the British Islands, is spread through a great part of Europe and Asia. It is common in the forest tracts of Germany, Russia, Hungary, the north of Asia, and Nepaul. It is larger and has fuller fur, in the colder latitudes.

In Britain it was formerly very abundant, and was one of the beasts of chase, as we learn from king Richard II.'s charter to the abbot of Peterborough, giving him permission to hunt the hare, fox, and wild cat. The fur in those days does not seem to have been of much value, for it is ordained in bishop Corboyl's canons, A.D. 1127, that no abbess or nun should use more costly apparel than such as is made of lambs' or cats' skins. The wild cat is still found in the hilly parts of the north of England, and more plentifully in Scotland and some parts of Ireland.

Its general form is robust; the tail is bushy, and fuller at the termination. The general colour is gray, undulated with transverse blackish stripes; a black streak runs down the back; the tail is annulated; the soles of the feet to the heel are black; two black stripes pass from the eyes over and behind the ears. The fur is deep. Length of head and body one foot ten inches; of the tail eleven inches. (Fig. 33.) Temminck gives the total average length as three feet. Hares, leverets, rabbits, and birds are its prey. It is bold and savage, and defends its young with great obstinacy. Formerly naturalists regarded this cat as the origin of the domestic cat, but of late years this opinion has been questioned.

33.—Wild Cat.

In the first place, a cat in a domestic condition was one of the animals reverenced by the ancient Egyptians, and mummies of it are found in the pits of Thebes. Now this cat was not the common wild cat, but a distinct species. In the second place, the domestic cat is not noticed as being one of the domestic animals of the ancient Britons by any of the Latin writers, nor, indeed, do we hear of it in our island till the tenth century, when we find its value fixed at a high rate, and laws enacted to regulate its preservation. The Welsh statutes of Howel Dha (who died A.D. 948) are, in fact, proofs of its importance; and such laws would hardly have been laid down had not the animal been regarded in the light of a new and important acquisition. If it were indeed the offspring of the wild cat, which then abounded

in the forests of our island, the opportunities of procuring young broods would have been so abundant, that all regulations respecting it would have been superfluous; and still less would the then considerable sums of a penny as the price of a kitten before it could see, two-pence until it caught a mouse, and after that four-pence, have been established. There are, besides, other regulations, all tending to prove the high value affixed to the domestic cat at that period. In the third place, the wild cat is much larger than our domesticated cat, and this is contrary to the general rule, domesticated animals being larger than their wild relatives. It may be observed that the tail of the wild cat is rather short, full, and cylindrical; while in the domestic cat it is long and taper. We here give (Fig. 34) the tail of a

Fig. 34.

domestic cat which had betaken itself to the woods, leading an independent life (*a*); and the tail of the true wild cat (*b*). Besides, the wild cat stands higher on the limbs, and is of a more lynx-like figure. Dr. Fleming considers it probable that the domestic kind is originally from Asia, but Rüppel and Temminck consider it as decidedly the descendant of the tame Egyptian cat (*Felis maniculata*), found now wild in Upper Egypt and Nubia. It is easy to perceive how from Egypt the

domestic cat would pass into Greece and Italy, and so into the western provinces of the Roman Empire. It is most probable, then, that Temminck and Rüppel are correct; but still, has not the domestic cat in Europe subsequently intermingled with the wild cat, and produced a mixed, though fertile breed? We are inclined to think so. Cats of the domestic kind often assume wild habits, and live in warrens, preserves, and woods: we must distinguish between these and the true wild cat.

The Egyptian Cat. (*Felis maniculata.*)

This cat was discovered in Nubia by Rüppel, west of the Nile, near Ambukol, in a rocky district overrun with brushwood. It is of the size of a moderate domestic cat, and is probably of the same stock as that of the domestic cat which the Egyptians honoured. Rüppel considers it a descendant of that breed, but it may be, and probably is, from the wild original race, and is indigenous in Nubia. (Fig. 35.) It agrees exactly with the preserved mummies of cats which the Egyptians embalmed. The following is a detailed description of this species:—

The woolly or ground hair is in general of a dirty ochreous, darker on the back and posterior parts, and becoming gradually lighter on the anterior and lateral parts; longer hair of a swarthy dirty white, so that the appearance of the animal is grayish-yellow. Skin of the edges of the lips and of the nose bare and black. Beard and bristles of the eyebrows shining white, brown at the roots; edges of eyelids black; iris glaring yellow. From the inner corner near the eye there is a dark-brown streak running in the direction of the nose, and there is a white streak as far up as the arch of the eyebrows; between these two streaks is another grayish one extending on the forehead by the side of the ears and under the eyes. Outside of the ears gray, inside white and without tufts of hair. Eight slender black undulating lines arise on the forehead, run along the occiput, and are lost in the upper part of the neck. Cheeks, throat, and anterior part of the neck shining white. Two

35.—Egyptian Cat.

ochreous-yellow lines spring, the one from the outer corner of the eye, the other from the middle of the cheek, and meet both together under the ear, and two rings of the same colour encircle the white neck; below the rings there are spots of ochreous-yellow. Chest and belly dirty white, with similar spots or semicircular lines. A dark streak along the back becomes lighter as it rises over the shoulders, and darker on the cross. This streak is gradually lost on the upper part of the tail, the lower surface of which is white-yellow. The tail is almost of an equal thickness, rather slender, and with two dark rings at its point. The extremities, which have less hair in proportion on the outer side, are of the general colour, with besides five or six blackish semicircular bands on the fore-legs, and six distinct dark cross streaks on the hind-

legs. The inner sides are lighter in colour, with two black spots or streaks on the upper parts of the fore-legs, and the hind extremities show the cross streaks winding around the thighs towards the inside. Foot, soles, hinder parts of ankles, and wrists shining black. Length two feet five inches, the tail being about nine; height at the shoulder about nine inches and a half. The description was taken from an aged female.

The Jaguar. (*Felis Onca.*)

The jaguar is the leopard or panther of the American forests, and in power and daring almost approaches to the tiger of the Indian jungles. We have already stated that specimens of this savage beast have been confounded with the leopard; but the jaguar, besides differing in other points, always displays a bold streak or two of black, extending across the chest from shoulder to shoulder, which is a distinctive character. The rosettes on the body are very large, open, and somewhat angular, with a central spot or two of black in each; a central chain of black dashes extends along the spine. (Fig. 36.) The jaguar, though varying in size, generally exceeds the leopard; and its form is more robust and less agile and graceful. The limbs are short, but immensely thick and muscular; the head larger and of a squarer contour, and the tail of less comparative length. Of all the American Felidæ, the jaguar is the most formidable. It prefers the marshy and wooded districts of the warmer latitudes, and haunts the vast forests along the larger rivers. It swims and climbs with equal ease, and preys on the larger domestic quadrupeds, on peccaries, capybaras, and monkeys, as well as on fish and tortoises. Sonnini saw the scratches left by the claws of the jaguar on the smooth bark of a tree some forty feet high, without branches; he traced the marks of several slips made by the climber, but the animal had at last reached the top. Humboldt heard the jaguar's yell from the tops of the trees, followed by the sharp, shrill, long whistle of the terrified monkeys, as they seemed to

36.—Jaguar.

flee. It takes birds on their nests, and fish in the shallows; and, in some districts, the havoc it makes among horses, cattle, and sheep is terrible. So great are the numbers of these beasts in the Spanish colonies, that, according to Humboldt, four thousand were annually killed; and two thousand skins were exported every year from Buenos Ayres only. The empty shells of turtles were pointed out to Humboldt as having been cleared of their contents by the jaguar, which watches them as they come to the sandy beaches to lay their eggs, pounces upon them, and turns them on their backs; he then insinuates his paw between the shells, and scoops

out the contents as clean as with a knife. As he turns many more than he can devour at a meal, the Indians often profit by his dexterous cunning. The eggs of the turtle are often dug up by him out of the sand, and devoured; and young turtles, on their road to the water, or in shallows, are also destroyed.

It is not often that the jaguar voluntarily attacks man. When hard pressed, however, he makes a resolute defence. The Indians often despatch him with their poisoned arrows, and sometimes boldly attack him with lances. On the plains the lasso is used with great effect.

There is a black variety of the jaguar, le Jaguar noir of the French, and probably the Jaguarete of Marcgrave. This seems to have been the animal noticed by Lieut. Maw, R.N. ('Journal of a Passage from the Pacific to the Atalantic:' 1829), at Para, as a black onça. It had been procured up the rivers, and was a formidable beast, with limbs as thick as (Lieut. Maw says thicker than) those of a Bengal liger.

The Puma. (*Felis concolor*, Linn.)

This large feline animal is often called the American lion, chiefly, as it would appear, from its uniformity of colour, which, combined with its ferocity, led the early travellers to give it that appellation. Thus John de Laet (1633) says that lions are found in Peru, though they are few and not so ferocious as they are in Africa, and that they are called in the native tongue Puma. In 'The Perfect Description of Virginia,' (a tract, 1649,) "Lions, bears, leopards, and elks" are enumerated. Hernandez describes it (1651) as the Puma seu Leo Americanus, and contends, rightly enough, that it is not a true lion. By Piso the animal is noticed as the Cuguacuara. Marcgrave terms it the Cuguacurana of the Brazilians; De Azara, the Gouazouara of Paraguay. Hence the French name, often used by British writers, Couguar. Charlevoix describes it under the erroneous names of Carcajou and Quincajou. The Anglo-Americans term it "panther," and under this name Lawson, Catesby, and others describe it.

37.—Puma.

In its general contour the puma is elegantly formed; but the limbs are very thick, while the head is comparatively small, particularly in the female. The general colour is silvery-fawn above, fading into white beneath and on the inside of the limbs; the ears on the outside, particularly at their base, the sides of the muzzle and the end of the tail, which is destitute of a tuft, black. Length from nose to root of tail, about four feet; of the tail, upwards of two feet. The young are marked with three chains of blackish-brown streaks along the back, and the sides, shoulders, and neck have clouded spots of the same colour. As the animal advances in age, these markings fade, and ultimately disappear. (Fig. 37.)

The puma is extensively spread throughout North and South America; but it is not only more scarce than formerly, but its range is more contracted; and, as civilization advances, will be still further reduced. This beautiful animal is savage and ferocious, but easily tamed, and soon becomes very familiar. The late Mr. Edmund Kean had one in his possession, which was perfectly domesticated; and we have seen others very gentle, though playful and animated. Lawson, who, in his 'History of Carolina,' well describes the puma, is therefore in error when he states that "when taken young it is never to be reclaimed from its wild nature." This writer says- "The Panther (puma) climbs trees with the greatest agility imaginable, is very strong-limbed, catching a piece of meat from any animal he strikes at; his tail is exceedingly long; his eyes look very fierce and lively, are large, and of a grayish colour; his prey is swine's-flesh, deer, or anything he can take. He halloos like a

28.—Puma.

man in the woods when killed, which is by making him take to a tree, as the least cur will presently do; then the huntsmen shoot him; if they do not kill him outright he is a dangerous enemy when wounded, especially to the dogs that approach him. This beast is the greatest enemy to the planter of any vermin in Carolina. His flesh looks as well as any shambles meat whatsoever: a great many people eat him as choice food, but I never tasted of a panther, so cannot commend the meat by my own experience. His skin is a warm covering for the Indians in winter, though not esteemed among the choice furs. This skin dressed makes fine women's shoes or men's gloves." (Fig. 38.)

The puma is indeed a very destructive animal: not only the peccary and the capybara fall a prey to his destructive habits, but sheep, hogs, and cattle are among his victims; of the former he has been known to kill fifty in a single night. It is not often that the puma attacks man, though when wounded he becomes a dangerous foe. Sir F. Head, in his 'Journey across the Pampas,' gives the following interesting narrative, in proof of the fear of man which this animal, in common with others, entertains. The person who related it to Sir Francis was himself the actor in the scene:—

"He was trying to shoot some wild ducks, and, in order to approach them unperceived, he put the corner of his poncho (which is a sort of long narrow blanket) over his head, and, crawling along the ground upon his hands and knees, the poncho not only covered his body, but trailed along the ground behind him. As he was thus creeping by a large bush of reeds, he heard a loud sudden noise, between a bark and a roar: he felt something heavy strike his feet, and, instantly jumping up, he saw, to his astonishment, a large lion actually standing on his poncho; and, perhaps, the animal was equally astonished to find himself in the immediate presence of so athletic a man. The man told me he was unwilling to fire, as his gun was loaded with very small shot; and he therefore remained motionless, the lion standing on his poncho for many seconds: at last the creature turned

his head, and walking very slowly away about ten yards, he stopped and turned again: the man still maintained his ground; upon which the lion tacitly acknowledged his supremacy, and walked off." (Fig. 39.)

39.—Puma.

Audubon, in his 'Ornithological Biography,' gives a spirited account of the chase of the puma, or Cougar as he terms it, which was hunted by dogs, and men armed with rifles: it was driven by their united exertions from tree to tree, and perished, fighting with the dogs, having received several balls, one of which produced a mortal wound. On the Pampas the puma is hunted with dogs, and, while it is engaged in the conflict surrounded by them, the dexterous Gaucho strikes him senseless with his bolas, or throws his lasso over him, and, galloping off, drags him along the ground till almost lifeless, when the dogs rush upon him and tear him to pieces.

The Ocelot. (*Felis pardalis.*)

This elegantly marked species of tiger-cat is a native of Mexico, Paraguay, and probably of Peru. (Fig. 40.) It measures nearly three feet in the length of the head and body, the tail is about a foot long, and the medium height is about eighteen inches. The ground-colour of the fur is gray slightly tinged with fawn; upon this are disposed longitudinal bands, of which the margins are perfectly

40.—Ocelot.

black, the central parts being of a deeper fawn than the general ground. These ribands of black, enclosing a deep fawn, become deep black lines and spots on the neck and head and on the outer aspect of the limbs. From the top of the head towards the shoulders there pass several diverging black bands, and on the top of the back the line is quite continuous. The tail is spotted upon a ground like that of the body. The term ocelot is a corruption of the Mexican names Tlacoozelotl, or Tlalocelotl, as given by Hernandez, who terms it *Catus pardus Mexicanus*.

The ocelot is often exhibited in menageries, and is generally good-tempered and playful: we have seen several which might be said to be perfectly domesticated. Bewick states that "nothing can soften the natural ferocity of its disposition, nor calm the restlessness of its motions. One of these animals, shown at Newcastle in 1788, although extremely old, exhibited great marks of ferocity. It was kept closely confined, and would not admit of being caressed by its keeper." Harsh usage and close confinement have often spoiled

the temper of animals; and the fault is always laid to their disposition, and not to mismanagement. Mr. Bennett informs us that a specimen which was kept in the Tower menagerie was extremely familiar, and had much of the character and manners of the common cat. Its food consisted principally of rabbits and birds; the latter it plucked with great dexterity, and always commenced its meal with the head, of which it seemed particularly fond; but it did not eat with the ravenous avidity which characterizes nearly all the animals of this tribe.

41.—Ocelot.

Of the manners of the ocelot in a state of nature little is known. It inhabits the deep forests and preys upon small quadrupeds and birds; climbing the trees in quest of the latter, and lying in wait for them concealed among the foliage. (Fig. 41.) It is said to take monkeys by a very subtle mode of proceeding. When it perceives a troop

of these active creatures, it immediately stretches itself out, as if dead, on the limb of some tree; urged by curiosity they hasten to examine the supposed "mortal remains" of their enemy,—the foremost pays dearly for his curiosity.

THE CHATI. (*Felis mitis.*)

The chati is regarded by Desmarest as the Chibi-guazu of Azara. It is a native of Paraguay and other parts of South America, and is much smaller than the ocelot. Azara describes it as averaging three feet six inches in total length. The following is Fred. Cuvier's description of a female living in the menagerie of Paris:—"About a third larger than the domestic cat: length, exclusive of tail, rather more than two feet; tail, eleven inches; height to middle of back, about one foot two inches. Ground-colour of fur on the upper parts, pale yellowish; on the lower, pure white; at the roots, dull gray, and very thick and close. Body covered with irregular dark patches: those upon the back entirely black and disposed longitudinally in four rows; those upon the sides surrounded with black, with the centres of a clear fawn, arranged in nearly five rows. Spots upon the lower part of the body, where the ground-colour of the fur is white, full, and arranged in two lines composed of six or seven patches on each side. Limbs covered with nearly round spots of smaller dimensions: on the fore-legs, near the body, two transverse bands. On the throat a sort of half collar, and on the under-jaw two crescent-shaped spots. Behind each eye two bands about two inches long, terminating opposite the ear. Forehead bordered by two lines, between which are numerous spots, and, at their origin, a blackish mark from which the whiskers spring. Outside of the ear black, with a white spot upon the small lobe. Base of the tail spotted with small blotches, which towards the end run into half-rings, which are broadest on the upper surface. Pupil round." (Fig. 42.)

This animal was extremely gentle and familiar, so much so, indeed, that if persons to whom it was attached

passed its cage or did not approach it, it would express its discontent or solicit their attention by a short cry; and when caressed it manifested great delight.

According to Azara, the chibi-guazu is so common, that his friend Noseda captured eighteen individuals in two years within two leagues of his *pueblo*. Yet it would appear that few are acquainted with the animal, neither

42.—Chatf.

the huntsman nor his dogs being able to penetrate its haunts. By day it remains concealed in the most impenetrable and secluded places, only coming abroad after dark, especially when the night is stormy. The chibi-guazu then daringly enters courtyards and destroys the poultry or carries them away. When the night is moonlit they do not venture near inhabited spots, and are besides so wary, that it is hopeless to lie in wait for them with a gun. Men and dogs are most cautiously avoided. Each pair is supposed to have their own exclusive range of territory, for a male and female, and no more, are always caught in the same place. Those which Noseda caught

soon became reconciled to captivity, and had much of the habits of a cat: nearly the whole of the day they passed in sleep rolled up in ball-like form; twilight and night were passed in pacing to and fro close to the sides of their den. They never quarrelled unless they were much irritated, and then they struck at each other with their fore-paws; when they crossed or interrupted each other's movements in traversing the den, they spit and gesticulated like a common cat. They were fed upon various kinds of flesh, rats, fowls, ducks, young dogs, &c. Cats' flesh gave them the mange, under which they soon sank: snakes, vipers, and toads occasioned violent and continued vomiting, under which they wasted away and died. Dogs equalling themselves in size they would not attack: fowls were their favourite food; these they caught by the head and neck, and instantly killed, stripping their feathers before beginning to eat them. In the night their eyes shone like those of a domestic cat, which in their manners, in their mode of licking the fur and cleaning themselves, they entirely resembled. Azara concludes by stating that a young one which Noseda caught became so thoroughly domesticated, that it slept on the skirts of his clerical gown and went about loose. No animal could be more tractable; but the neighbours, among whose poultry it made havoc, killed it.

The Pampas Cat. (*Felis Pajeros.*)

This species is also called Jungle-cat, and by the Spanish colonists Gato Pajero. (Fig. 43.)

The fur of this animal is very long, some of the hairs of the back being upwards of three inches, and those of the hinder part of the back four and a half or nearly five inches long. General colour pale yellow-gray. Numerous irregular yellow or sometimes brown stripes run obliquely from the back along the sides of the body. On each side of the face two stripes of a yellowish or cinnamon colour commence near the eye and extend backwards and downwards over the cheeks, on the hinder part of which they join and form a single line, which encircles

the lower part of the throat. Tip of the muzzle and chin white; a spot in front of the eye, and a line beneath the eye, of the same colour; belly, inner side and hinder part of fore-legs, white also. An irregular black line running across the lower part of the chest, and extending over the base of the fore-legs externally; above this line two other transverse dark markings more or less defined on the chest. On the fore-legs three broad black bands, two of which

43.—Pampas Cat.

encircle the leg: on the posterior legs about five black bands externally, and some irregular dark spots internally. Feet yellowish, and under side of tarsus of a slightly deeper hue. On the belly numerous large irregular black spots. Ears moderate, with long white hairs internally; externally of the same colour as the head, except at the apex, where the hairs are black, and form a slight tuft. Tail short, somewhat bushy, and devoid of dark rings or spots; the hairs are in fact coloured as those on the back. On the upper part of the body each hair is brown at the base, then yellow, and at the apex black.

On the hinder part of the back the hairs are almost black at the base, and on the sides of the body each hair is gray at the base; there is then a considerable space of yellowish-white colour: towards the apex they are white, and at the apex black. The greater number of the hairs of the moustaches white. Length, from nose to root of tail, twenty-six inches; of tail, fur included, eleven inches. Height of body at shoulders, thirteen inches. Size about equal to that of the common wild cat of Europe; but the Pampas cat is stouter, its head smaller, and its tail shorter. (Waterhouse.)

This cat was known to Azara, but till recently European naturalists were but little acquainted with it. Fischer, in his 'Synopsis Mammalium,' put it among those species that are not well determined. Azara says that the natives call this animal Gato pajero, because it lives on the plains, concealing itself in jungles without entering the woods or thickets. Whether this species exists in Paraguay, Azara states, was a point he could not determine, but that it might perhaps have been formerly seen there before the country became well peopled. He caught four in the Pampas of Buenos Ayres, between 35° and 36° S. lat., and three others on the Rio Negro. They are found, he adds, on both sides of La Plata. Its food consists principally of apereas, or wild guinea-pigs.

According to Mr. Darwin ('Zoology of the Beagle'), this cat inhabits Santa Cruz, Patagonia, and Bahia Blanca.

"This animal," observes Mr. Darwin, "takes its name from *paja*, the Spanish word for 'straw,' from its habit of frequenting reeds. It is common over the whole of the great plains which compose the eastern side of the southern part of America. From the accounts I received I have reason to believe that it is found near the Strait of Magellan, which would give it a range of nearly 1400 miles in a north and south line," for Azara states that it is to be found as high north 30° S. lat. One of Mr. Darwin's specimens was obtained at 50° S., at Santa Cruz: it was met with in a valley where a few thickets were growing. When disturbed it did not run away,

but drew itself up and hissed. The other specimen which Mr. Darwin brought to England was killed at Bahia Blanca.

The Lynx.

The name of lynx is applied by zoologists to a subdivision of the Felidæ, well marked externally, and regarded by some as entitled to a distinct generic rank. About eight species are described, but there is still considerable confusion among those which are natives of America. The available characters which the lynxes present consist in the pencils which tuft the ears, in the shortness of the tail, and the proportionate elevation of the body at the haunches.

The lynx is one of those animals respecting which many absurd fables have been popularly current, but which are now in no danger of being revived. Pliny (lib. vii., 25) classes the lynx among the monstrous productions of Æthiopia, in the existence of which he seems to have implicitly believed. The lynx is often alluded to by the ancient poets, but from many expressions we easily perceive that they had no very precise ideas about the animal; the lynx of poetry was sometimes a leopard or panther. Virgil calls the lynxes of Bacchus "variæ," and in another place alludes to the skin of the spotted lynx ("maculosæ lyncis").

The representations of lynxes on antique gems and sculptures are as unsatisfactory and vague as the allusions in classic poetry. Still, however, the lynx described by Aristotle, Ælian, and Oppian was, it must be confessed, not one of these doubtful creatures, but a definite species, and, as we think, the caracal.

The Caracal. (*Felis Caracal.*)

This animal derives its modern name from the Turkish, *cara*, black, and *kulash*, ear. Its Persian name has the same meaning, Sugah-gush or Sia-gusch (*sia*, black, *gusch*, ear). It is widely distributed, being found in Persia, India, Barbary, Nubia, Egypt, and the whole of

Africa to Caffraria, Turkey, and Arabia. The general colour of the body is of a pale reddish-brown, with a vinous tinge; the lower parts are paler. Two spots of pure white are near each eye, one on the inner side of and above the eye, the other beneath its outer angle. The edges of the upper lip, the chin, and lower lip are white, as are the insides of the limbs. The whiskers rise from a series of black lines. The ears are long and tapering, and are surmounted by a pencil of long black hairs; their colour externally is black. The tail reaches only to the heel or hock-joint. (Fig. 44.) Tem-

44.—Caracal.

minck gives the measurements as follows:—Length two feet ten inches, of which the tail measures ten; average height about fourteen inches. We have ourselves seen much larger individuals The eyes of the caracal have a marked nocturnal character, and are large, bright, and scowling in their expression. The limbs are extremely

muscular, and its whole contour denotes great activity. The caracal feeds on small quadrupeds and birds, the latter of which it pursues even to the tops of the trees. It is said to follow the lion and other large beasts of prey for the purpose of feeding on what they leave. The caracal leaps upon its victim and holds it with remarkable tenacity, as was noticed by Ælian. Oppian also alludes to its mode of springing upon hares, deer, &c. According to Temminck, these animals are in the habit of hunting in packs, like wild dogs, and of running down their prey; most probably they creep towards it like the cheetah, and spring suddenly upon it. (Fig. 45.) Pennant, quoting Thévénot, states that they are often brought up tame, and used in the chase of lesser quadrupeds and the larger sort of birds, as cranes, pelicans, peacocks, &c., and that when they seize their prey they hold it fast with their mouth and lie motionless on it. He also adds, on the authority of Hyde, that the Arabians, who call it Anak-el-ard, affirm that it hunts like the panther, jumps up at cranes as they fly, and covers its steps when hunting.

In captivity the caracal is very irritable, often displaying great ferocity. Of its fierceness and strength Dr. Charleton gives evidence, for he relates that he saw one fall on a hound, which it killed and tore to pieces in a moment, although the dog defended itself to the utmost. It would appear, from our repeated personal observations, that few animals of the feline race are more impatient of confinement. Excepting in the instance of very young examples, we never knew one that would suffer the approach of strangers without exhibiting tokens of savage anger. Apparently annoyed by the light, they retire to a corner of their den, and there crouch in sullen and suspicious mood, repelling every attempt towards familiarity by a snarl. When thus irritated the ears are drawn down close to the head, the eyes glare with an expression of malignant fury, and the teeth are displayed, while, at the same time, they utter a deep hissing not unlike that of a cat, and very

45.—Caracal.

different from the growl of the lion or tiger. In a state of nature they avoid the face of man, and, though of comparatively small size, are dangerous enemies when hard-pressed or wounded.

The Booted Lynx. (*Felis caligata.*)

This is a small species with the tail much longer in proportion than in the caracal. The total length is about

three feet, of which the tail measures thirteen inches. The ears are large, red within, and tipped with a pencil of brown hairs; the sole and posterior part of the foot, or leg as it is usually called, are of a deep black. The upper parts of the body are of a deep bluish gray, in some specimens fulvous, clouded with gray and sprinkled with black hairs; the lower parts, throat, and breast are reddish; the thighs are marked with indistinct bands of rather bright brown, and two bands cross the cheeks. The tail is black at the tip, with three or four incomplete rings above it, separated from each other by whitish intervals. (*Fig.* 46.) The female has generally the tints more yellow; the young have well-defined dark bands on their sides. This species inhabits the south of India, and Africa, from Egypt and Barbary to the Cape of Good

46.—Booted Lynx.

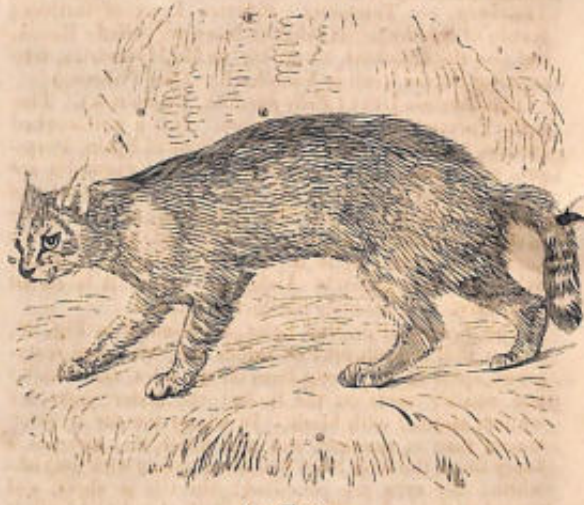
Hope. Birds and small quadrupeds are its prey. It makes havoc among the flocks of wild guinea-fowls in Africa, nor does it refuse the remains of large quadrupeds on which the lion or panther has feasted. Cuvier applied the term *Lynx des Marais* to this species, as well as to the chaus, but at the same time with a remark that some consider the two animals to be distinct.

The Chaus. (*Felis Chaus*, Güldenst.)

The Chaus, according to Colonel Sykes, is called *mota rahn manjur*, or larger wild cat, by the Mahrattas. This species has been cleared up by Rüppel from the confusion in which it had become involved. He describes it as well covered with fur, the under-coat of which is woolly and soft, but the long hairs are not thickly set. The colour of the woolly hair is a dirty Isalish ochre yellow, darker on the back, lighter beneath; the long hairs are of the same tint at the base, have a dark-brown middle ring, and are tipped with grayish-yellow, whitish, or saffron, so that the appearance produced is a mixed colouring of grayish-yellow and dirty-white. Many of the hairs on the sides are tipped with black, and, where these are numerous, dusky lines or dashes are produced. The saffron-tipped hairs prevail on the back, and form a yellow stripe from the shoulders to the tail; the nose is black; above and below the eye is a large white spot; a black streak runs from the inner corner of the eye to the nose. The edges of the lips are black, and encircled by a white ring. Cheeks and whiskers white, a few black bristles being interspersed among the latter; back of the ears gray-brow, with black pencils. Externally the limbs are barred with four or five transverse black bands. The tail is one-fourth as long as the body, and annulated towards the termination, which is black and abrupt. (Fig. 47.)

The Chaus inhabits the north of Africa along the course of the Nile, and perhaps more remote districts. It is found in the morasses and bushy lowlands that border the Caspian Sea, and along the banks of its tributary

rivers. It is said to be common in Persia: it is also an inhabitant of the Deccan. Everywhere it appears to give preference to marshes and boggy wastes, where brushwood affords it shelter. It lives upon birds, small quadrupeds, and even fishes: it seldom climbs trees, and is not easily tamed.



47.—Chaus.

The European Lynx.

(*Felis Lynx*, Temminck, not Linn. and Nilsson; *F. virgata*, Nilsson.)

This is the ordinary lynx of Europe, extending from Scandinavia to Naples and the Pyrenees. Specimens were lately living in the menagerie of the Zoological Society of London from Norway. Güldenstadt states it to exist on the Caucasus, where it is a great

pest. Besides this lynx, Europe possesses the following:—

The Arctic Lynx (*Felis borealis*, Temminck, not Thunberg; *F. Lynx*, Linn. and Nilsson). It inhabits the north of Scandinavia, and probably Siberia and the forest of Ural.

The great Lynx (*Felis cervaria*, Linn.; *F. borealis*, Thunberg, not Temminck; Siberian Lynx of furriers; Kat-lo of Swedes). It inhabits Norway, Asiatic Russia, and also the Caucasus, according to M. Menestries, who says the Persians call it Vaarchach. (See Nilsson.)

The Pardine Lynx (*Felis pardina*, Temminck). This is the Portuguese Lynx of furriers. It is a well-marked species, inhabiting the mountain regions of Spain, Portugal, and other southern districts. Fine examples are living in the menagerie of the Zoological Society of London, and specimens are preserved in the Paris Museum which were killed in Portugal, not far from Lisbon, in 1808: it is a beautiful animal. Colonel Sykes obtained skins in Andalucia, where it is called Gato clavo. It inhabits the Sierra Morena.

The European or Red Lynx, represented in Fig. 48, is of a dull reddish-gray or rufous tint, with dark rusty-brown spots of an oblong form on the sides, and rounder and smaller spots on the limbs; the under parts are whitish mottled with black. In winter the fur is much longer than in summer, and also fuller, and assumes a hoary tinge, the long hairs becoming tipped with grayish-white; the ears are pencilled; the tail is short, and tipped with black. The length of the head and body is nearly three feet; of the tail, six or seven inches. The European Lynx feeds upon small quadrupeds and birds, and climbs trees easily. Hares, squirrels, rabbits, and also sheep, fall victims to it. When attacked by a dog it lies down on its back and defends itself with its claws. Those we have seen in captivity were very playful. Its fur is valuable in commerce; the colder the climate and season of the year, the finer and fuller it is.

"The limits of the lynx," observes Cuvier, "in the

48.—European Lynx.

ancient continent are not perfectly ascertained. We know, indeed, that it is common in the forests of the north of Europe and Asia. MM. Blumenbach, Bechstein, and Tiedemann cite instances of their having been killed even lately in Germany, but they are becoming more and more scarce. M. Schintz says that it is not uncommon in the mountains of Switzerland. M. Delabre cites an instance of one killed in Auvergne in 1788.

The Canada Lynx. (*Felis Canadensis*, Geoff.)

There is some question about this species, which we believe to be entirely identical with the *F. borealis* of Temminck; and consequently that the title *Canadensis* is a mere synonym. (Fig. 49.) The range of this boreal lynx is not limited, therefore, to the old world only, but is also extended to the northern parts of America. It is found north of the great lakes, and eastward of the Rocky Mountains: it is rare on the sea-coast, does not frequent the barren grounds, but is not uncommon in the wooded districts of the interior. It is found on the Mackenzie River as far north as 66°. Specimens in the museum of the Zoological Society of

49.—Canada Lynx.

London were procured by Douglas in California. Dr. Richardson states that the early French writers on Canada, who ascribed to this species the habit of dropping from the trees on the backs of deer and destroying them by tearing their throats and drinking their blood, gave it the name of Loup Cervier. The French Canadians now term it indifferently Le Chat or Le Peeshoo. With respect to its attacking deer in the way said, the statement is erroneous; and if really practised by any ferocious animal, is most probably so by the puma. The same habit has been attributed to the wolverene or glutton, from a mistake of Charlevoix in applying to this lynx the name of Carcajou, which is proper to the wolverene only. The following is Dr. Richardson's description:—

"The head is round, the nose obtuse, and the face has much the form of that of the domestic cat, but the facial line is more convex between the eyes. The ears are erect, triangular, and tipped by an upright slender tuft of coarse black hairs: they are placed about their own breadth apart, and on their posterior surface they have a dark mark beneath the tip, which is continued near both margins downwards towards their bases. On the body and extremities the fur is hoary, most of the hairs being tipped with white; on the crown of the head, and for a broad space down the middle of the back, there is a considerable mixture of blackish-brown, and on the sides and legs of pale wood-brown. In some specimens these colours produce an indistinct mottling, but in general there are no defined markings. A rufous tinge is also occasionally present about the nape of the neck, and on the posterior parts of the thigh. The tail is coloured like the back, except the tip, which is black. The fur is close and fine on the back, longer and paler on the belly. When blown aside it shows on the middle of the back a dark liver-brown colour from the roots to near the tip, but on the sides it is for the greatest part of its length of a pale yellowish-brown, being merely a little darker near the roots. The legs are thick, the toes very thick and furry, and are

armed with very sharp awl-shaped white claws, shorter than the fur. There are four toes on each foot, those on the hind-foot being rather the largest, but both feet have much spread. Length three feet one inch," &c.

This Boreal or Canadian lynx is by no means courageous: it never ventures to attack large quadrupeds, but preys chiefly on the American hare, for the capture of which it is well provided. "Its large paws, slender loins, and long but thick hind-legs, with large buttocks scarcely relieved by a short thick tail, give it an awkward, clumsy appearance. It makes a poor fight when it is surprised by a hunter in a tree; for though it spits like a cat, and sets its hair up, it is easily destroyed by a blow on the back with a slender stick; and it never attacks a man. Its gait is by bounds straightforward, with the back a little arched, and lighting on all the feet at once. It swims well, and will cross the arm of a lake two miles wide, but is not swift on land. It breeds once a year, and has two young at a time." Its flesh is eaten by the natives, and is white and tender, but destitute of flavour, and closely resembles that of the American hare. The skin of this species is an important article in commerce. The annual importation by the Hudson's Bay Company is stated to be from seven to nine thousand.

Besides this lynx there are others in America.

Family—URSIDÆ.

(Bears, and allied animals.)—The members of the family group termed Ursidæ are characterized for the most part by their robust figure, by their heavy gait, and plantigrade walk, as well as by the tubercular surface of the grinders—a form connected with diet in great part, at least, consisting of vegetable products. The alimentary canal is simple. Most of the species are expert climbers; they conceal themselves in caves, holes of the

earth, or in hollow trees, in which the females produce their young.

We may here remark that under the general term Plantigrada many genera have been associated together, which are by no means nearly related; and some indeed have been placed with the bears, only from their feet being plantigrade, while in reality they belong to another family group. We shall not adopt the terms Plantigrada or Digitigrada as the names of sections of the Carnivora; the animals of which order, as will be shown on a future occasion, resolve themselves into well-marked families.

Genus Ursus.

The animals of this genus, viz., the Bears, are distinguished by their ponderous bulk, massive limbs, and heavy gait: they are completely plantigrade in their walk, but their huge claws, which are tremendous weapons, are not retractile; they are, however, well adapted for digging. They are completely omnivorous, devouring flesh, vegetable roots, grain, fruits, and honey. "The bear," says Aristotle, "is an omnivorous animal, and by the suppleness of its body climbs trees, and eats the fruits, and also legumes; it devours honey likewhere, having first broken up the hives; as well as crabs, ants, and flesh."

In the 'Tour on the Prairies,' the ranger describes the fondness of the bear for honey in language which, if it be not quite classical, is at all events graphic. "The bears is the knowingest varmint for finding out a bee-tree in the world; they 'll gnaw for a whole day together at the trunk, till they make a hole big enough to get in their paws, and then they 'll haul out the honey, bees and all."

The dental formula of the genus Ursus is as follows:

Incisors $\frac{6}{6}$; Canines $\frac{1-1}{1-1}$; Molars $\frac{6-6}{7-7} = 42$.

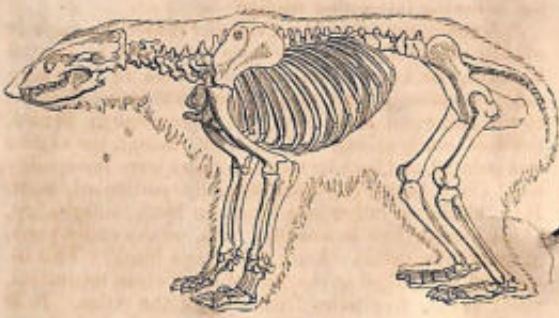
(Fig. 50.) Fig. 51 represents the skeleton of the Polar Bear.

50.—Teeth of Bear.

The feet are 5-toed; the tail is short; the limbs are robust; the eyes are small, but quick and animated; and the head is large and broad across the top.

Europe, Asia, and America present us each with their

pecular species of this genus; but with respect to Africa the existence of any there has been more than doubted, and many attempts have been made to explain away the passages in ancient writers referring to the bear in Africa.



51.—Skeleton of Polar Bear.

Pliny, however, not only asserts that the bear is not an African animal, but expresses surprise at a statement in some records that a hundred Numidian bears were brought to Rome during the consulship of M. Piso and M. Messala, for the Circus, by Domitius Ahenobarbus, curule ædile, who also brought a hundred Æthiopian chasseurs (see lib. viii.). But as Pliny elsewhere states that there are neither boars, nor stags, nor goats, nor bears in Africa, we know how far he can be trusted. That there are bears in Africa, notwithstanding all that has been said to the contrary, is now well established.

Ehrenberg hunted a bear in Abyssinia: his words are, "Moreover we ourselves have seen in the mountains of Abyssinia, and therefore in Africa itself, an animal most like to a bear—nay, why had I not said a bear?—and hunted it repeatedly, but in vain. It is called by the

natives Karrai." And he also observes that Forskal has brought tidings of an indigenous Arabian bear.

It is ascertained, moreover, that the bear exists on the range of the Atlas and the Tetuan mountains; and in a letter to the curator of the Zoological Society, from Edward Blyth, Esq., while on his voyage to India, is the following interesting passage:—

"Upon questioning Mr. Crowther respecting the bear of Mount Atlas, which has been suspected to be the Syriacus, he knew it well, and it proves to be a very different animal. An adult female was inferior in size to the American black bear, but more robustly formed, the face much shorter and broader, though the muzzle was pointed, and both its toes and claws were remarkably short (for a bear), the latter being also particularly stout. Hair black, or rather of a brownish black, and shaggy, about four or five inches long; but, on the under parts, of an orange rufous colour; the muzzle black. This individual was killed at the foot of the Tetuan mountains, about twenty-five miles from that of the Atlas. It is considered a rare species in that part; and feeds on roots, acorns, and fruits. It does not climb with facility; and is stated to be very different-looking from any other bear. The skin, like that of the 'Sherif-al-Wady,'* was attempted to be preserved, but unfortunately met with the same fate." ('Zool. Proceeds.' August 10, 1841.)

The genus Ursus has been divided into the following subgenera, upon somewhat uncertain grounds, viz.:—*Danis*, *Prochilus*, *Helarctos*, and *Thalarctos*.

The Brown Bear. (*Ursus Arctos.*)

Ours of the French; Bar of the Germans. (Fig. 52.) This species, which is spread through all the mountain districts of Europe, from the arctic circle to the Alps and Pyrenees, and, as it is stated, through Siberia, Kamtchatka, and even Japan to the eastward, was formerly a tenant of the forests and wild hills of our island; whence in the time of the Romans it was im-

* A new species of Ox. Its skin was destroyed by rats.

ported to the capital of the world, in order to gratify the people by its combats in the circus. If Martial may be trusted, its ferocity was sometimes turned against the persons of criminals, who were condemned to a horrid death.

52.—Brown Bear.

The bear appears to have lingered, as did the wolf, longer in Scotland than in England, that country affording it better concealment; for in 'The History of the Gordons' it is stated that one of the family, so late as the year 1057, was directed by the king to carry three bears' heads on his banner, as a reward for his valour in slaying a fierce bear.

In later times, when a virgin queen enjoyed the sports of the bear-garden in Southwark, and a bearward was kept in the establishment of the highest nobility, bears were imported from the Continent to fight with savage dogs for "his lordship's pastime," no less than for the diversion of the commonalty. Such were the recreations of "the good old English gentleman, all in the olden time."

The general habits of the bear are well known: unsocial and solitary, they frequent the gloomiest recesses among the mountains, glens, and caverns, and the depths of the forests: there they dig or enlarge a cave in which to dwell, or usurp the hollow of some huge decayed tree, or form a sort of rude den under the covert of a maze of intertwined branches, lining their habitation with moss. Here they pass the winter, in a state bordering on torpidity; and it is during this retirement, in January, that the female brings forth her young, which are well formed, and very far from being the shapeless mass supposed by the ancients. The cubs are from one to three in number—mostly, however, two; at first their eyes are closed, and they remain blind for thirty days. When the bear retires to its winter-quarters on the approach of the cold season it is very fat, but on coming forth in the spring is generally observed to be lean, the fat having been absorbed for the nutriment of the system during the animal's torpidity: but a query here exists,—is the female, who produces her young, and has to attend to them, torpid? and can she suckle them without receiving any aliment herself? This is very improbable; and tends to prove that the seclusion of the animal is neither so absolute nor its torpidity so complete as is generally asserted. That bears support themselves in their winter retirement by sucking their paws is a vulgar error, and need not be seriously refuted.

Unless provoked by aggression, or incited by hunger, the Brown Bear seldom attacks man; but when roused is most formidable, and displays greater activity and address than might be expected from its heavy clumsy figure. Its strength is prodigious. Mr. Nilsson, a Swede, states that a bear has been seen, bearing a dead horse in his fore-paws, to walk on his hind-legs on a tree stretched across a river. (Fig. 53.) The firm support afforded by the well-developed sole and the form of the hinder limbs (the thigh-bone, though shorter, closely resembling in form that of a man), enables these animals not only to rear themselves up on their hind-feet, but even to walk erect with considerable facility, as was observed by

53.—Bear with dead Horse.

54.—Brown Bear.

Mr. Lloyd ('Northern Field Sports'), who asserts that they can proceed along in that position bearing the heaviest burdens.

In the wilds of the North the bear attains to a prodigious magnitude: Mr. Lloyd killed one of the weight of four hundred and sixty pounds, and they have been found to exceed seven hundred. (Fig. 54.)

Though bears, as Mr. Falk informs us, may reside for years in the neighbourhood of cattle without doing them any injury, yet they will sometimes visit herds solely from the desire of prey, and instances have been known of their climbing upon and tearing off the roofs of cow-

houses, in order to gain admittance to the cattle confined within, which, after slaughtering, they have managed to drag through the opening in the low roof, and carry away.

In the North the bear is hunted and taken in pit-falls and traps of various kinds, and in some countries there is no part of the animal which is without value.

The courage and devotion of the female bear in defence of her young are proverbial. No adventure can be fraught with more danger to the hunter than an attack upon one accompanied by her cubs, for the sake of which wounds and even death are encountered with unflinching resolution, uttering deep growls till the last moments.

The bear climbs trees or rocks with great dexterity, and descends in the attitude in which it ascends, availing itself cautiously of every projection. Those who have seen the bears in the Zoological Gardens climb to the top of their long poles, and fearlessly balance themselves at the top, soliciting food from the visitors, may conceive some idea of the animal's address. It also swims well and fast, and during the heat of summer frequently takes the water for the sake of the bath. When captured young, the bear is easily domesticated, and evinces no trifling share of intelligence. The age to which it attains is very considerable. Individuals have been kept between forty and fifty years in captivity.

A variety (*Ursus Pyrenaicus*, F. Cuv.), considered by some naturalists as a distinct species, inhabits the Pyrenees and the Asturias.

The Siberian Bear (*Ursus collaris*)

Approaches close in form to the Brown Bear, with the distinction of a large whitish collar, which passes over the upper part of the back and shoulders, and is completed on the breast. This is not improbably also a variety. (Fig. 55.)

Dr. Richardson describes a Brown Bear which he terms the Barren-ground Bear (*Ursus Arctos? Ameri-*

canus), and which is a native of the barren lands lying northward and eastward of the Great Slave Lake and extending to the Arctic Sea. "It differs," he says, "from the American Black Bear, in its greater size, profile, physiognomy, longer soles, and tail; and from the Grisly Bear also in colour and the comparative smallness of its claws. Its greatest affinity is with the Brown Bear of Norway, but its identity with that species has not been established by actual comparison. It frequents the sea-coast in the autumn in considerable numbers for the purpose of feeding on fish." (Fig. 56.)

56.—Siberian Bear.

56.—Siberian Bears.

THE AMERICAN BLACK BEAR. (*Ursus Americanus.*)

This species, the Sass of the Chippewayan Indians, the Musquaw of the Crees, is smaller than the Brown Bear; its muzzle is narrower, more arched and pointed, continued in a line without interruption from the forehead; the ears are more distant; and the fur, instead of being shaggy, is soft, smooth, and glossy black.

"The Black Bear," says Dr. Richardson, "inhabits every wooded district of the American continent, from the Atlantic to the Pacific, and from Carolina to the shores of the Arctic Sea." Everywhere, however, its numbers have been greatly thinned, owing to the value of the animal's skin in commerce; besides which the tide of European colonization has driven it to remoter districts, to mountain ranges, and vast forests as yet untouched by the axe, or only recently invaded by the

settler. In some parts of Canada it is still common, and tolerably abundant on the western coast as far as California. It has, we believe, been seen, but that rarely, in the Blue Ridge in Virginia. (Figs. 57, 58, 59.)

57.—American Black Bear.

The Black Bear feeds on berries and wild fruits; and to these it adds roots and eggs; and though it does not refuse animal food, yet it does not eat it from choice, but necessity; utterly neglecting it if vegetable aliment can be obtained.

This species is not very daring, and, unless forced to self-defence, or wounded, will seldom venture to attack a man, except in the instance of a female with cubs, the retreat of which she is solicitous to cover.

Its speed is said not to be very great, and it is asserted that a man may easily escape, especially in a willow grove, or in the midst of loose grass, where it stops for the purpose of reconnoitring. Dr. Richardson, however, "saw one make off with a speed that would have baffled the fleetest runner; and ascend a nearly perpendicular cliff with a facility that a cat might envy." In the Fur Countries this species usually hybernates,

selecting a spot under a fallen tree, where it scratches a hollow in the earth; here it retires at the commencement of a snow-storm, and the snow soon furnishes it with a close warm covering. Its breath makes a small opening in the snow, and the quantity of hoar-frost which occasionally gathers round the opening serves to betray its retreat to the hunter. In more southern districts, where the trees are larger, bears often shelter themselves in the hollow trunks. It has been observed by the Indians, that unless bears are very fat on the approach of winter, they do not hybernate; and as the males are often thin and exhausted in September, should the winter set in before they have time to recover their fat, they migrate southwards in search of food. So carefully do the females with young conceal themselves, that Dr. Richardson's numerous inquiries among the Indians of Hudson's Bay ended in the discovery of only one man who had killed a pregnant bear.

In the northern districts of America, as in Norway and other parts of the continent of Europe, the chase of

38.—American Black Bear.

59.—American Black Bear.

the bear is followed up with the utmost ardour, nor will it surprise us to learn that an animal from which the Indian derives so much benefit (its flesh and every portion being in request), and which in the hour of combat is terrible, should be the subject of many superstitious observances; pardon being asked for its slaughter, to which necessity impelled the hunters, and every means taken to propitiate the offended spirit of the dead animal.

The Black Bear is subject to varieties of colour; its fur being sometimes of cinnamon tint, and sometimes of a still more yellow tone. Occasionally it is seen with a white throat-mark.

Cinnamon bears, as well as black, exist in the gardens of the Zoological Society.

The Spectacled Bear. (*Ursus ornatus.*)

The Spectacled Bear, so called from the two semicircular marks of buff-colour extending from the muzzle and arching over each eye, is a native of the Cordilleras of the Andes in Chili. Its general fur is smooth, shining, and black; the muzzle is buff-coloured; the throat and chest are whitish. Of its habits nothing is known. Specimens exist in the gardens of the Zoological Society. (Fig. 60.)

In the 'Zool. Proceeds.' for 1833, p. 114, is the notice of a bear, brought to Caracas from the Andes, differing, according to Sir R. Ker Porter, in some points from the *Ursus ornatus*, of which it was evidently a mere variety.

60.—Spectacled Bear.

61.—Grisly Bear.

The Grisly or Grizzly Bear.

(*Ursus* (Danis) *ferox.*)

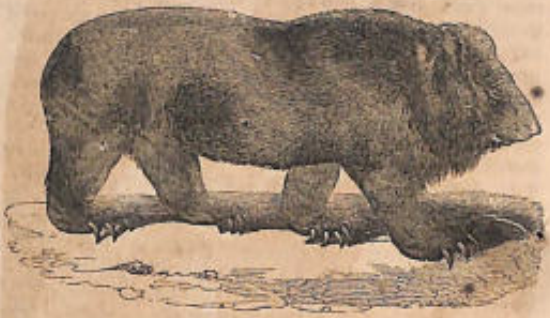
Ursus horribilis, Say; Meshch Musquaw of the Cree Indians; Hohhost of the Chopunish Indians. This formidable species is a native of the Rocky Mountains and the district eastward of them. To the north it has been observed as far as sixty-one degrees of latitude; to the south it is said to extend as far as Mexico. Everywhere it is dreaded for its great strength and ferocity; even the huge bison falls prostrate before it, and the savage conqueror "drags the dark bulk along" (weighing a thousand pounds) to its haunt, and digs a pit for its reception, repairing to it as hunger dictates, till the whole is consumed. (Fig. 61.) From the hunters of the North-

West, there have been numerous exciting narratives of contests with this ferocious animal. We give only one, supplied by Dr. Richardson, as being a good specimen, and of course to be depended on :—"A party of voyagers, who had been employed all day in tracking a canoe up the Saskatchewan, had seated themselves in the twilight by a fire, and were busy in preparing their supper, when a large grisly bear sprang over the canoe that was tilted behind them, and, seizing one of the party by the shoulder, carried him off. The rest fled in terror, with the exception of a metif, named Bourasso, who, grasping his gun, followed the bear as it was retreating leisurely with its prey. He called to his unfortunate comrade, that he was afraid of hitting him if he fired at the bear, but the latter entreated him to fire immediately, without hesitation, as the bear was squeezing him to death. On this he took a deliberate aim, and discharged his piece into the body of the bear, who instantly dropped its prey to pursue Bourasso. He escaped with difficulty, and the bear ultimately retreated to a thicket, where it was supposed to have died; but the curiosity of the party not being a match for their fears, the fact of its decease was not ascertained. The man who was rescued had his arm fractured, and was otherwise severely bitten, but finally recovered. I have seen Bourasso, and can add, that the account which he gives is fully credited by the traders resident in that part of the country, who are best qualified to judge of its truth from their knowledge of the parties. I have been told that there is a man now living in the neighbourhood of Edmonton-house, who was attacked by a grisly bear, which sprang out of a thicket, and with one stroke of its paw completely scalped him, laying bare the skull, and bringing the skin of the forehead down over the eyes. Assistance coming up, the bear made off without doing him further injury, but the scalp not being replaced, the poor man has lost his sight, although he thinks his eyes are uninjured. Mr. Drummond, in his excursions over the Rocky Mountains, had frequent opportunities of observing the manners of the grisly bears, and it often happened that in turning the

point of a rock or sharp angle of a valley, he came suddenly upon one or more of them. On such occasions they reared on their hind-legs, and made a loud noise like a person breathing quick, but much harsher. He kept his ground, without attempting to molest them; and they on their part, after attentively regarding him for some time, generally wheeled round and galloped off; though, from their known disposition, there is little doubt but he would have been torn in pieces, had he lost his presence of mind and attempted to fly. When he discovered them from a distance, he generally frightened them away by beating on a large tin box, in which he carried his specimens of plants. He never saw more than four together, and two of these he supposes to have been cubs; he more often met them singly, or in pairs. He was only once attacked, and then by a female, for the purpose of allowing her cubs to escape. His gun on this occasion missed fire, but he kept her at bay with the stock of it, until some gentlemen of the Hudson's Bay Company, with whom he was travelling at the time, came up and drove her off. In the latter end of June, 1826, he observed a male caressing a female, and soon afterwards they both came towards him, but whether accidentally, or for the purpose of attacking him, he was uncertain. He ascended a tree, and as the female drew near, fired at and mortally wounded her. She uttered a few loud screams, which threw the male into a furious rage, and he reared up against the trunk of the tree in which Mr. Drummond was seated, but never attempted to ascend it. The female, in the mean while retiring to a short distance, lay down, and as the male was proceeding to join her, Mr. Drummond shot him also. From the size of their teeth and claws, he judged them to be about four years old. The cubs of a grisly bear can climb trees, but when the animal is fully grown it is unable to do so, as the Indians report, from the form of its claws."

Lewis and Clarke give the measurement of one of these bears as nine feet from nose to tail, but had seen them of larger dimensions. They attain the weight of eight

hundred pounds. The length of the fore-foot is nine inches, of the hind-foot twelve, without including the enormous claws; its breadth seven inches. The tail is short, and lost in the shaggy hair. We query Lewis and Clarke's measurement of nine feet. (Fig. 62.)



62.—Grisly Bear.

The Grisly Bear digs with great facility, but when adult is not capable of ascending trees; a fortunate circumstance for the hunter, for such is the animal's tenacity of life, that it seldom falls until it has received many balls, and dogs have no chance with it except by enabling the hunter to attack it. It would seem, that though the adult Grisly Bears cannot climb trees, that the cubs are able, if the reports of the Indians are to be credited. (Fig. 63.) The cubs, and females with young, hybernate; but the older males often come abroad during winter for food.

An individual of this species, distinguished by his enormous size and ferocity, some time since attracted the attention of all who visited the gardens of the Zoological Society. He had previously been about twenty years in the Tower, when, at the breaking up of the menagerie

63.—Bear and Dogs

there, he was presented by his Majesty William IV. to the Society. His morose indomitable temper was never subdued, but remained unaltered, as if he had been at large surrounded by the savage rocks and gloomy pine-forests of his native regions.

The Syrian Bear. (*Ursus Syriacus.*)

Though the bear is distinctly alluded to in the Scriptures (see 2 Kings ii. 23, et seq.: also 1 Samuel xvii. 34, et seq.) as a native of Syria, few travellers have noticed the existence of this animal in that country. Hasselquist omits it in his catalogue of the animals given in his 'Travels in the Levant;' nor is it recorded as a species by Desmarest, Fischer, or Lesson. It is in fact only recently that naturalists have become aware that such an animal still prowled about the mountains of Lebanon. (Fig. 64.)

Matthew Paris, however, in his 'England,' relates how Godfrey, during the siege of Antioch, rescued a poor man from the attack of a bear, which, turning upon the warrior, unhorsed him, having lacerated his steed, whereupon he continued the combat on foot, and, though he received a most dangerous wound, succeeded in burying his sword up to the hilt in his savage adversary, and killed him. ('Hist. Engl.,' t. ii. p. 34, fol., Lond. 1640.) Seetzen (a German traveller in 1811) was informed in Palestine that bears existed in the mountains; and La Roque states that in his time they were tolerably abundant upon the higher Lebanon mountains, from which they descended at night in search of prey, and even occasioned apprehension to travellers.

Notwithstanding these casual notices, the animal remained in obscurity till brought before the scientific world by Emprich and Ehrenberg, who, in their 'Symbolæ Physicæ,' give the figure and description of a middle-aged female, killed near the village of Bischerre in Syria, and which they dissected. They observe, that Mount Lebanon is crowned with two snowy summits, one called Gebel Sanin, the other Makmel, both of which they

64.—Syrian Bear.

visited, but found bears only upon the latter, near the village of Bischerre, to the gardens of which they wander in winter, but in the summer remain in the neighbourhood of the snow. The individual killed was about four feet two inches long; her den, which they saw, was formed by great fragments of calcareous rock casually thrown together. The flesh of the animal was tasted, and found to be sapid, but the liver was sweet and nauseous. The gall is in great esteem; the skins are sold, and so is the dung, under the name of Bar-el-dub, the latter being used in medicine, and for diseases of the eye, in Syria and Egypt. The Syrian Bear frequently preys on animals, but for the most part feeds on vegetables; and

the fields of *cicer arietinus* (a kind of chickpea), and other crops near the snowy region, are often laid waste by it.

The Syrian bear is of a uniform fulvous white (sometimes variegated with fulvous): the ears are elongated; the forehead is but slightly arched. The fur is woolly beneath, with long, straight, or but slightly curled hair externally; a stiff mane of about four inches long runs between the shoulders. It was evidently this species which figured in the procession of Ptolemy Philadelphus at Alexandria, and which is called by Athenæus (a Greek writer of Lower Egypt, contemporary with Commodus) a bear of white colour and large size (ἄρκτος μὲν λευκὴ μεγάλη μία); and which some, strange to say, have regarded as the Polar Bear from the shores of the Arctic Sea.

65.—Thibet Bear.

The Thibet Bear. (*Ursus Thibetanus.*)

This species was discovered by M. Duvaucel in the mountains of Sylhet, and about the same time by Dr. Wallich in the Nepâl range. (Fig. 65.) The neck of the Thibet bear is thick, and the head flattened, the forehead and muzzle forming almost a straight line; the ears are large; the body compact, and the limbs thick and clumsy; but the claws are comparatively weak. The general colour is black, but the lower lip is white, and a large Y-shaped mark of the same colour on the breast sends up its branch on each side in front of the shoulder. It is not of large stature. Fruits and other vegetable productions appear to constitute its principal food.

The Malayan Bear.

(*Ursus* (Helarctos) *Malayanus.*)

Bruang of the Malays. This species is found in Sumatra, and with others of the subgenus Helarctos, is distinguished by the extensibility of the lips, the length and flexibility of the tongue, the shortness and smoothness of the fur, and the magnitude of the claws. (Fig. 66.)

The Malayan Bear, or Sun Bear, is said to be a sagacious animal, and to display great fondness for sweets. The honey of the wild bees of its native forests is supposed to be a favourite food, and certainly its long slender tongue well adapts it for the reception of this delicacy. It feeds extensively on vegetables, and is said to be attracted to the vicinity of man by the young shoots of the cocoa-nut trees, to which it is very injurious: indeed Sir T. Stamford Raffles found those of the deserted villages in the Passuma district of Sumatra destroyed by it.

It is often kept domesticated, and is playful and familiar. Of one which lived two years in the possession of Sir T. Stamford Raffles, he writes:—"He was brought up in the nursery with the children, and when admitted to my table, as was frequently the case

66.—Malayan Bear.

gave a proof of his taste by refusing to eat any fruit but mangosteens, or to drink any wine but champagne. The only time I ever knew him to be out of humour was on an occasion when no champagne was forthcoming. He was naturally of an affectionate disposition, and it was never found necessary to chain or chastise him. It was usual for this bear, the cat, the dog, and a small Blue-Mountain bird or lory of New Holland, to mess together, and eat out of the same dish. His favourite playfellow was the dog, whose teasing and worrying was always borne and returned with the utmost good-humour and playfulness. As he grew up he became a very powerful animal, and in his rambles in the garden he would lay hold of the largest plantains, the stems of which he could scarcely embrace, and tear them up by the roots."

The general colour of this bear is jet black, with the

muzzle of a yellowish tint, and a semilunar white mark upon the breast. When adult it measures about four feet six inches along the back.

THE BORNEAN BEAR. (*Ursus* (Helarctos) *euryspilus*.)

In general form, habits, manners, and colouring this species closely resembles the Sumatran bear; but is perhaps rather less and has a large orange-coloured patch upon the chest; the fur is extremely close. In captivity it is playful and good-tempered. (Fig. 67.)

67.—Bornean Bear.

The Bornean Sun-Bear not only sits upon its haunches with ease, a position it usually assumes, but can stand upright with great facility. Its senses, especially those of sight and smell, are very acute; the olfactory organ indeed appear to be in continual exercise. By various and amusing gestures it solicits food from spectators; and when a morsel of cake is held at a small distance beyond its reach, it expands its nostrils, protrudes its upper lip and often its tongue, while with its paws it makes every effort to obtain the proffered delicacy. Having gained it and filled its mouth, it places the remainder with singular coolness on its hinder feet, as if to keep it from being soiled by the floor, and brings it in successive portions to its mouth. It often places itself in an attitude of entreaty, earnestly regarding the spectators, and stretching forth its paws ready to receive their offering. It is fond of notice, conscious of kind treatment, and delights to be patted and rubbed; but when vexed or irritated, refuses all attention so long as the offending person remains in sight.

Both this and the preceding species excel in climbing, and they are said to occasion much injury to groves of cocoa-nuts, both by climbing up them, and devouring the top shoot, thereby killing the tree, and also by tearing down the fruit, to the milky juice of which they are very partial.

THE SLOTH-BEAR. (*Ursus* (Prochilus) *labiatus.*)

Ours paresseux and Ours jongleur of the French; Aswail of the Mahrattas. (Fig. 68.)

This uncouth animal was first described and figured (from the life) by Bewick, in his 'History of Quadrupeds,' without any name, but as an animal that had hitherto escaped the attention of naturalists. It was then (1791) taken for a sloth, and received from Shaw the names of *Bradypus ursinus*, and *ursiformis;* and from Pennant that of Ursiform Sloth. Blainville and others restored it to the genus Ursus; Illiger having previously founded the genus Prochilus for its reception, a name which is still retained in a subgeneric sense only.

68.—Sloth-Bear.

The Sloth-Bear is a rough, clumsy animal, with short massive legs and huge hooked claws; and possessing great mobility of the snout. It inhabits the mountainous parts of India, and was observed by Colonel Sykes in Dukhun.

It dwells in caves, and its food is said to consist of fruits, honey, and termite ants, for the demolishing whose houses its claws are well adapted. It is said also frequently to descend to the plains, and commit great havoc on the sugar-cane plantations. On these occasions it becomes an object of pursuit to the Indian and European hunters.

The sloth-bear attains to nearly the size of the brown bear of Europe; it is robustly framed. The hair is re-

markably long and shaggy; on the upper part of the head and neck it is sometimes twelve inches in length, and separates into two portions, one of which overhangs the eyes, imparting a peculiarly heavy appearance to the animal's physiognomy; while the other forms a thick mane across the shoulders. The general colour is black, intermixed with brown; a triangular mark on the breast is white. The head is carried low; the back arched; the muzzle, which is of a dirty yellowish white, is very much elongated: the lips are thin, flexible, and project at all times considerably in front of the jaws; and possess singular mobility, being capable of protrusion in a tubular form far beyond the muzzle, thus constituting an instrument of suction. The tongue is long, flat, and square at the extremity. We have seen the animal protrude his lips, while at the same time they were kept apart for several minutes together, and on these occasions the interior of the mouth was distinctly visible.

A pair of these animals, which we have observed in captivity, were at times very playful, contending with each other in rude sport with great violence, struggling and endeavouring to throw each other down, and all the while uttering a loud roaring noise; at other times, huddled together, they passed whole hours in sleep. In India it is often led about by mountebanks and jugglers, as is the brown bear in Europe.

According to Captain Williamson ('Oriental Field-Sports') these animals are numerous on the boundaries of Bengal, which to the east and west are mountainous, rocky, and overrun with low underwood: their principal resort is under banks, in large burrows or natural cavities; but they do not hybernate. Their pace is shuffling and awkward, but quick enough to overtake a man on foot. They ascend trees with great facility.

The natives greatly dread them; the very sight of a bear, however distant, disheartens them, knowing, as they do, the strength and savage disposition of the sable shuffler. Of their ferocity, and the dilatory torments to which they subject their victim, Captain Williamson gives several horrible instances: observing, that they

" will chew and suck a limb till it is a perfect pulp," not biting away the flesh, like most beasts of prey.

The Polar Bear.

(*Ursus* (Thalarctos) *maritimus.*)

Ours polaire of the French. Within the regions of the Arctic Circle dwells the Polar Bear, one of the largest and most formidable of the group. (Fig. 69.) Formed to endure the most intense severity of cold,

69.—Polar Bear.

this monarch of a gloomy, desolate realm prowls in sullen majesty over wastes of snow and among ice-glazed rocks in quest of food; he traverses fields of ice along the shore, clambers over rugged icebergs, or even swims out from floe to floe, or from island to island, ravenous for his prey. He dives with admirable address,

and is capable of contending with his prey amidst the rolling waves. The seal forms its favourite diet, together with marine exuviæ, such as dead fishes and cetaceous animals; and he will attack even the walrus himself. In summer mountain-berries are eagerly sought for, nor are sea-weeds or marsh-plants rejected. Of the activity of this bear in the water we may form an idea from a statement by Cartwright, that he saw a polar bear dive after a salmon and kill his fish.

Captain Lyon gives the following account of its mode of hunting the seal:—"The bear, on seeing his intended prey, gets quietly into the water, and swims until to leeward of him, from whence, by frequent short dives, he silently makes his approaches, and so arranges his distance, that, at the last dive, he comes to the spot where the seal is lying. If the poor animal attempts to escape by rolling into the water, he falls into the [illegible] clutches; if, on the contrary, he lies still, his [illegible] makes a powerful spring, kills him on the ice, and [illegible] him at leisure." The same author informs us that this bear not only swims with rapidity, but is capable of making long springs in the water. Captain Sabine states that he saw one about midway between the north and south shores of Barrow's Straits, which are forty miles apart, though there was no ice in sight to which he could resort for rest. (Fig. 70.)

The pace of this bear on shore is a kind of shuffle, but more quick than might be expected; and when at full speed as rapid as the sharp gallop of a horse.

The average length of the polar bear (which has been greatly exaggerated) is about six feet; but it occasionally attains to larger dimensions. Pallas describes an adult female six feet nine inches in length. The greatest length, from nose to tail, recorded by Captain Phipps, is seven feet one inch; the weight of the beast being 610 lbs. Captain Ross records the measurement of one seven feet ten inches, the weight being 1160 lbs.: and Captain Lyon, that one, which was unusually large, measured eight feet seven inches and a half, and weighed 1600 lbs.

100.—Reitbok.

by a long maxillary gland running down each side of the face between the angle of the eye and the muzzle, indicated by a naked space on the skin, of a black colour, and moistened by a peculiar secretion. These animals live singly or in pairs, frequenting jungles, dense reed-beds, and the underwoods of forests, most preferring hills or mountain-districts of moderate elevation. When pursued, they dive through the thicket, and quickly disappear.

Tragulus, Ogilby.—*Horns in both sexes; maxillary glands oblong; interdigital pores wanting; inguinal pits wanting; teats in the female, four.*

The Kleenbok (*Antilope Perpusilla*).

This little antelope is a native of South Africa, and lives singly or in pairs among the bushes, in the covert of which it hides itself so completely, that it is not often to be seen even where it is abundant. It is very active, shy, wary, and timid, and displays great address and cunning in eluding pursuit. When domesticated it becomes very familiar, will distinguish persons about it, and answer to its name when called. This species is the *A. pygmæa* of Desmarest, who confounds it with the Guevi of Senegal: it is also the *A. cærulea* of Col. H. Smith.

The height of the Kleenbok at the shoulder is about a foot; the head is long and pointed. The general colour

101.—Kleenbok.

is dark slaty brown, passing in the under parts to ashy gray; the forehead and nose are brown bordered on each side by a line of sandy red; the legs are reddish brown; the horns are small and straight, not more than an inch and a half long in the male; nearly an inch in the female. (Fig. 101.)

CAPRIFORM ANTELOPES.

Head heavy; neck short; contour robust; limbs strong; hoofs adapted for rocky or mountain situations; horns small or moderate; hair coarse and deep, or harsh and wiry.

RUPICAPRA.—*Horns common to both sexes, rising immediately above the orbits, at first vertically, then looking abruptly backwards, small and smooth, with sharp points; lips hairy and attenuated; suborbital sinuses wanting; inguinal pores and post-auditory sinuses; teats of females, two.*

THE CHAMOIS (*Antilope Rupicapra*).

This celebrated animal is found in all the alpine chains of Europe and Western Asia, in the Alps, the Pyrenees, the Carpathian and Grecian mountains, and the ranges of Caucasus and Taurus. Everywhere it tenants the loftiest ridges, displaying the most astonishing activity. During the summer it is only to be found on the mountain-tops, or in sequestered rock-girt glens, where the snow lies unmelted throughout the year; but in winter it descends below the line of perpetual snows to the grassy slopes, where it becomes doubly cautious and wary. Its senses of hearing, sight, and smell are extremely acute, and it scents the approaching hunter at the distance of half a league. (Fig. 102.) When its fears are once excited, it bounds from rock to rock, as if to gain a view of the surrounding district, uttering at the same time a singular hissing sound; but no sooner has it caught sight of its enemy, than off it bounds, scaling the most fearful rocks, clearing chasms, and leaping from crag to crag

102.—Chamois.

with amazing rapidity. Its course is not stopped by a perpendicular precipice of twenty or thirty feet in depth: with astonishing boldness it takes the leap, striking the face of the rock repeatedly with its feet, for the purpose both of breaking the fall, and of directing itself more steadily to the point it aims at. It pitches on the smallest ledge, where the eye of man scarcely discerns room for its foot; and it traverses with security the beetling shelf that overhangs the deepest abyss. The perils of the chamois-hunter have been too often narrated to need repetition; his life is one of perpetual jeopardy: he is like a man infatuated by a spell, and though he knows the awful risk he runs, yet to the chase is he impelled

by the same feelings which urge the gamester in a career of ruin. The sketch (Fig. 103) represents the dangerous situation of two celebrated hunters in 1826, and is copied from a print published at Basel.

The food of the chamois consists of mountain herbs and flowers, and the tender shoots of shrubs; it seldom drinks, but is extremely partial to salt, and many stones are met with in the Alps hollowed out by the continual licking of the chamois, on account of the saltpetre with which they abound.

103.—Chamois hunters.

104.—Chamois.

At the root of each horn on the back of the head there is a sinus or opening of the skin, which does not seem to be connected with any gland, nor is its use understood. The females produce one kid, rarely two, in March or April. The chamois exceeds two feet in height: the whole body is covered with long hair of a deep brown in winter, and brownish fawn-colour in summer; the chaffron, muzzle, and sides of the lower jaw are white or straw-coloured; the tail is very short, (Fig. 104.)

Mazama, Ogilby.—*Horns in the male only, compressed laterally at the base, diverging as they rise upwards, then hooking backwards and inwards, rough and scabrous, and giving off above their base a bold, compressed, pointed prong directed forwards; lips hairy; neither in-*

guinal pits nor lachrymal sinuses; interdigital pits distinct; teats in the female, four; knee-brushes large; accessory hoofs wanting.

The Prongbuck (*Antilope Furcifer*).

The Prongbuck is a native of the western parts of North America, from the 53° of north latitude to the plains of Mexico and California; presuming that it is identical with the animal described by Hernandez as the Mazama. It is gregarious in its habits, frequenting wide open plains or hills of moderate height, but is never found to inhabit forests or closely-wooded districts. It migrates from north to south, according to the season. On the banks of the southern branch of the Saskatchewan and on the upper plains of the Columbia river it is very numerous. The prongbuck is compactly formed, active, and vigorous; and, on firm ground, will outstrip most animals, but after a slight fall of snow a good horse will easily overtake it. These animals, like many other Ruminants, display a sort of stupid curiosity at the sight of novel objects, which, as Dr. Godman states, the Indians, and even the wolves, turn to their own advantage. If they crouch down, assume strange postures, now move forwards, now stop, or play antics, the prongbucks wheel round and round the object of their attention, decreasing their distance at every turn, till at last they approach near enough to be killed by the Indian, or sprung upon by the wolf. Their flesh, however, is not in any estimation, and it is only in times of scarcity that the Indian will take the trouble of hunting them. The females produce one or even two kids early in the month of June. The prongbuck stands three feet in height at the shoulder: its body is covered with closely compacted hair standing out from the skin, and of a most singular texture; it is tubular, or hollow like a quill, but so brittle and devoid of elasticity that it snaps with the smallest effort, and when pressed between the thumb and finger crushes like a dry reed, and never regains its original form; on the head, ears, and legs the fur is close and of

105.—Prongbuck.

the ordinary quality; that on the body is two inches long, but down the back of the neck it is six inches in length, and forms a mane. The general colour is pale fawn, the hairs being of a bluish tint at the roots; the under parts and inner aspect of the limbs are white; a broad disc of white surrounds the tail, and passes over the croup; and the throat is marked also with two transverse white bands. (Fig. 105.) This, it must be observed, is the winter dress of the animal; in summer the new coat which it then acquires consists of hair of the ordinary quality, which as the winter comes on gives place to the covering described.

NEMORHEDUS, Smith.—*Horns short, parallel, curved gently backwards, annulated at the base and longitudinally striated; in both sexes, muzzle naked. Suborbital sinuses in the form of a circular orifice. Neither inguinal pores nor knee brushes. Limbs stout. Fur harsh and wiry; a nuchal mane. Teats four.*

THE CAMBING-OUTAN, OR WILD GOAT OF THE MALAYS

(*Antilope Sumatrensis*, Desm.).

In aspect and manners the Cambing-outan resembles the common goat and the ibex; it inhabits the forests which clothe the mountains of Sumatra, and is bold and active. The Cambing-outan stands about two feet three

104.—Wild Goat of the Malays.

inches in height at the shoulder, and is covered with long coarse hair of a dark brown or black colour; the mane along the back of the neck being white, and the hair on the lower jaw being of a straw-colour. On each side of the muzzle there is a naked linear space; the suborbital sinuses are small. (Fig. 106.) This species is closely allied to the Thar of the Nepâl (*Antilope Thar*, Hodgson). In this group the Goral of Nepâl (*Antilope Goral*, Hardwick) is placed by Mr. Hodgson ('Zool. Proceeds.' 1834, p. 85); but it has no suborbital sinuses, nor is the muzzle entirely naked. It will form the type of a distinct subgenus (*Kemas*, Ogilby).

BOVIFORM ANTELOPES.

As the antelopes of the last section approximate to the true goats, so, on the other hand, do the animals of this section approach the oxen. They do not, however, all display an equal degree of proximity: some, indeed, as the Nyl-ghau, are closely allied to groups among the true antelopes, while others have nothing of the antelope in form or appearance. In general they are distinguished by their massive contour, large size, and powerful limbs, conjoined with a heavy head, short neck, and elevated withers. The horns are large, often very thick and solid, and the eyes small: they are in fact bovine in their contour and habits, and gradually link on with the genus Bos. In those which approach the nearest to this genus there are horns in both sexes.

Tragelaphus, Ogilby.—*Horns in the male only. Suborbital sinuses large. Interdigital fossæ distinct. Inguinal pits wanting. Muzzle broad and naked. Teats in the female, four.*

The Nyl-ghau (*Antilope picta*).

This magnificent species, which stands upwards of four feet in height at the shoulder, is a native of the dense forests of India, where it resides alone or in pairs; it is extremely vicious, resolute, and powerful, and will turn

upon its pursuers with great fury. Even in confinement it is not to be approached without caution. Previous to making its attack it drops upon its fore-knees, and in that attitude gradually advances, till within a certain distance of its foe, when it darts suddenly forward with amazing force and velocity. Bold and spirited, however, as it is, it is the most common prey of the tiger. During the day the nyl-ghau lurks in the covert of the forest, whence early in the morning or during the night it wanders forth to feed, invading the adjacent corn-fields and cultivated lands. This species is often bred in captivity both in this country and in India. The female usually produces two at a birth.

107.—Nyl-ghau.

108.—Nyl-ghau.

The male considerably exceeds the female in size. The general colour is slaty blue; in the female, tawny red. The lips, chin, and under parts are white; there is a large white spot on the throat, two smaller ones on the cheeks, and one in the front and two in the rear of each pastern-joint. The young males resemble the females in their colour, which is exchanged for slaty blue on arriving at maturity. A bunch of long pendent hair hangs from the fore part of the neck, and a similar tuft terminates the tail. (Figs. 107 and 108.)

The limbs of the nyl-ghau are well formed, but when the animal is standing are gathered close under the body, and the tail is drawn in between the hind-legs. Mr. Ogilby regards this animal as the Hippelaphus of Aristotle. It is placed by the author of the article on Antelopes in the 'Penny Cyclopædia' in the same group with the Steenbok, Grysbok, and Klipspringer of Africa; but it has neither their form nor habits,

KOBA.—*Horns only in the male; long, stout, nearly straight, inclined backwards, with a slight inward tendency. Inguinal pores distinct. Suborbital sinuses wanting. Muzzle broad and naked. Teats in female, four.*

THE KOBA, OR SING-SING (*Antilope Koba*, Ogilby).

This species is the "grande vache brune" of the French of Senegal, of which country it is a native. It equals the common stag in stature, and is covered with a coat of long rough hair; a rough bristly mane runs down the back of the neck. The general colour is dark sandy red, passing into gray on the under parts; the face and limbs are dark brown or black; the lips, chin, and a

109.—Koba.

stripe over each eye are white. Of the native habits of the koba little is known; in captivity, judging from the specimens we have seen, it is a gentle and quiet animal. When at rest its attitude resembles that of the nyl-ghau. An allied but smaller species, the Kob, or "petite vache brune" of the French, inhabits Western Africa. The figure (109) of the koba represents the female.

ORYX.—*Horns in both sexes, long, erect, annulated; muzzle nearly naked, or quite; interdigital pits large; neither suborbital sinuses nor inguinal pores; teats of female, four.*

THE ADDAX (*Antilope Addax*, Licht.).

This animal is the Strepsiceros of Pliny, which he states is termed by the Africans Addax or Addas; and, according to Rüppel and Hemprich, and Ehrenberg, who may be said to have re-discovered this species in Dongola, it is denominated Akasch, or Akas, or Addas by the Arabs, with the additional prefix of Abu, "father"—thus, Abu-Addas, a title they bestow on many other animals, as for example the sacred ibis, which they call Abu-Hannes, or Father John. The addax appears to be widely spread in Central Africa, tenanting the deserts in pairs, or perhaps small groups; but of its habits we have no detailed accounts. It stands three feet in height at the shoulder, and is heavily made; the head is large, the neck thick, and the legs robust. The horns are long and round, rather slender in proportion to their length, twisted outwards and describing two turns of a wide spiral, annulated to within five or six inches of the points, which are smooth and sharp; the form of the horns of the female does not differ from that of the male, but in the young they are almost straight. The ears are pretty long and proportionally broader than in most of the smaller antelopes, and the tail reaches almost to the hough and is terminated by a switch of long, coarse, gray hair. The whole head and neck, both above and below, are of a deep reddish brown colour, except a transverse

110.—Addax.

mark of pure white across the lower part of the forehead, between the orbits, which expands on the cheeks and half surrounds the eyes; a patch of black curly hair surrounds the root of the horns, and there is a scanty beard of the same colour on the larynx; all the rest of the animal, including the entire body from the neck backwards, as well as the legs and tail, is grayish white; the hoofs are black, and remarkably broad, to enable the animal to pass more easily over the fine and loose sands of the deserts in which it resides. (Fig. 110.)

The Blauwbok (*Antilope leucophæa*).

This antelope is a native of South Africa, and was formerly common within the boundaries of the Cape

Colony, where it is now never seen. It occurs in the extensive open plains north of the Gariep, living in pairs or small families of five or six. It is a bold and fierce animal, and when wounded will turn upon the hunter with great resolution. At certain seasons it is reported to attack indiscriminately every animal that approaches near it. The blauwbok stands three feet seven inches in height at the shoulder: the horns exceed two feet in length, and are formidable weapons; they are round, uniformly curved backwards, and marked with from twenty to thirty prominent rings; the points, for the extent of six inches, are smooth, and terminate very acute. The term blauwbok, or blue-buck, has been

111.—Blauwbok.

112.—Abu Harb.

given to this animal by the Dutch colonists from its peculiar hue, resulting from the colour of the hide, which is deep black, being reflected through the ashy-gray hair that covers it, giving it a general dark blue tone. (Fig. 111.)

The Abu-Harb (*Antilope leucoryx*).

This species is the Oryx of the ancients, a term now given to an allied South African species, but which of right belongs to the Abu-Harb, which lives in large herds in Sennaar and Kordofan, feeding principally on the leaves of various species of acacia. It is represented in abundance on the monuments of Egypt and Nubia,

and in particular in the inner chamber of the great pyramid at Memphis, where a whole group of these antelopes are represented, some driven forward, others dragged along by the horns, or by a cord around their neck, apparently as trophies brought from a conquered country, or a tribute or present from some subjugated nation.

This animal nearly equals the addax in size. The horns are long and slender, arched gently backwards, annulated at the base, and very sharp at the points. The tail is long, and tufted at the extremity with black and gray hairs mixed together. The hair on the head, body, and extremities is universally short, and lies smoothly along the hide, except upon the ridge of the back, where it is rather longer and reversed, or turned towards the head in a direction contrary to that on the other parts of the body, and forming a short reversed mane from the middle of the back to the occiput. The head is white, with a brown mark descending perpendicularly from each orbit, and expanding over the cheek, and a similar stripe passing down the centre of the face from the horns to the muzzle; the whole neck also, on the throat as well as on the upper part, is of a uniform rusty brown colour, but, with these exceptions, all the rest of the body, as well as the legs and tail, are milk white. (Fig. 112.)

The Oryx (*Antilope Oryx*).

The oryx is a native of South Africa, and differs from the Abu-Harb in having the horns straight: there is a large black mark on the forehead, united with a broad stripe across each cheek. (Fig. 113.)

This powerful antelope is found in the karroo south of the Orange river, and is resolute and dangerous when hard pressed, using its long sharp horns with amazing energy and address, often transfixing several of the hunter's dogs before he can get within shot. The horns measure three feet in length.

113.—Oryx.

THE CANNA (*Antilope Oreas*);

the Eland or Elk of the Dutch colonists of the Cape; the Impoof of the Caffres.

The canna is a native of Southern Africa, and the largest of all the antelopes, if it can be so termed, measuring full five feet in height at the shoulder, and weighing from seven to nine hundredweight. The horns in the male are large and heavy, measuring a foot and a half in length, nearly straight, sharp at their points, and surrounded almost to the top with a thick prominent spiral wreath. In the female the horns are smaller, and often almost destitute of a wreath. The muzzle is naked; the neck is thick and compressed at the sides, as in the ox, with a large protuberance on the throat, and a deep-hanging dewlap. From the centre of the forehead to the tail runs a short and nearly erect mane, of dark brown hair, which is reversed along the

back of the neck, but directed in the usual way along the dorsal spine. The shoulders are very much elevated, the processes of the vertebræ being greatly elongated at the withers. The tail ends in a black tuft. The general colour is reddish-fawn above; white on the under parts; an ashy-gray tint generally prevails on the head and neck. (Fig. 114.)

The flesh of the canna is in high estimation, consequently the animal is much sought after. Unlike antelopes generally, it acquires fat, and indeed often becomes so loaded with it as to be incapable of much exertion. It is asserted that when the animal is hard run, a red oily perspiration has been seen to ooze from the pores of its skin, and that it will sometimes drop down from plethora. The canna is mild and gentle, living in large herds upon

114.—Canna.

the plains and low hills, the old males generally residing apart: so little suspicious are they, that a horseman may ride through the very midst of a herd without causing any alarm, and in this way the sportsman may easily pick out and bring down with his gun the largest and the fattest. The well-conditioned males are generally chosen, and to such an extent have the herds been thinned of these, that some have been seen without a single male among them. The parts of this bovine antelope most esteemed are the large muscles of the thighs, which, when cured and dried, are termed thigh-tongues, from their flavour and fineness of grain.

CALLIOPE, Ogilby.—*Horns only in the male: no lachrymal sinuses nor interdigital pores; inguinal pits distinct; muzzle naked; horns spiral; teats in female, four.*

THE KOODOO (*Antilope Strepsiceros*).

This magnificent antelope is about four feet in height at the shoulder, and is heavily and robustly made, more resembling in external appearance an ox than an antelope. The muzzle is broad and naked; the ears large and slouching; the limbs thick and muscular. The horns of the male are about four feet in length, very thick at the base, and beautifully twisted into a wide sweeping spiral of two turns and a half, surrounded by a prominent wreath, or rather keel, which follows their flexure; they spread boldly outwards, and the animal generally carries them thrown back on the shoulders, partly for the sake of keeping them from striking against branches or becoming entangled in brushwood, and partly on account of their great weight.

The koodoo is a native of South Africa, and is found along the wooded borders of the rivers of Caffraria, living in small families of five or six individuals, and feeding on the shoots and leaves of trees and bushes. Desmarest says it leads a solitary life in mountain districts, but in these respects he is in error; it dwells neither on the hills nor the open plains, but in the wooded tracts following the course of rivers; nor is it solitary.

115.—Koodoo.

When chased, it takes to the water, and swims vigorously; and though heavy, it leaps with wonderful agility. Desmarest says it takes bounds of surprising extent, and it has been seen to clear the bars of a gate of the height of ten feet, though it had but a very limited space for gaining the impetus necessary for the leap. When hard pressed, the males are dangerous from their immense strength and determination, and from their formidable horns, which they wield with great address. The koodoo, however, when taken young, is easily tamed, and becomes quiet and gentle.

The general ground-colour of the koodoo on the back and sides is a light fallow-brown, with a narrow white

ribbon along the spine, and eight or ten similar bands descending from the back and passing obliquely down the sides and hips; the belly and under parts are pale silvery brown. On the neck and withers is a thin spare mane of a brown colour, and the chin, throat, and breast are furnished with similar long hairs, forming a species of beard. The cheeks are marked with two or three round white spots, and a narrow gray line passes from the anterior angle of the eye down towards the muzzle. The tail is moderately long, and equally covered with short hair. (Fig. 115.)

BUBALUS, Ogilby.—*Horns in both sexes, heavy, thick, and annulated, first inclined forwards, then suddenly bent backwards, making a bold angle in front; lachrymal sinuses minute; interdigital pits large; inguinal pores wanting; muzzle half naked; teats in the female, two.*

THE BEKR-EL-WASH, OR WILD OX OF THE ARABS

(Antilope Bubalus).

This animal is the Bubalus of the ancients; the "animal Africæ proprium, vituli cervive quâdam similitudine" of Pliny. Its representation occurs among the figures on the monuments of Upper Egypt. This animal is spread throughout a great extent of northern Africa, living in numerous herds on the confines of the Tell, or cultivated district, and the Sahara or Great Desert. According to Captain Lyon, it is found on the mountains south of Tripoli. Though Barbary may be regarded as its real habitat, yet it is not altogether limited to that extent of country, for it sometimes crosses the Libyan desert, and gains the banks of the Nile; and was once probably common in Upper Egypt.

The Bubalus, or Bekr-el-Wash, is as large as a heifer, and very bovine in appearance; the head is singularly long and narrow, with a straight flat chaffron; hence the eyes appear as if placed high in the head. The

116.—Wild Ox of the Arabs.

shoulders are elevated, and the neck resembles that of the ox; the general colour is red-brown, a black tuft of long hair terminating the tail. (Fig. 116.)

The bubalus is easily tamed, and, according to Dr. Shaw, of so familiar a disposition, that the young calves frequently mix with domestic cattle, and soon learn to attach themselves to the herd without attempting to escape afterwards. The male bubalus in its mode of combat resembles the bull; he lowers his muzzle to the ground, and striking upwards, or from side to side, endeavours to gore and toss his antagonist with his horns, which are very formidable weapons.

There is in South Africa a species very nearly allied

to the Bekr-el-Wash of Barbary, termed by the Dutch the Hartebeest (*A. Caama*, F. Cuvier). It resides in large herds, and is an object of the chase, its flesh being very finely flavoured, and more nearly resembling the beef of the ox than that of any other animal except the canna. It is moderately fleet, its pace when at full speed resembling a heavy gallop; but when at some distance from its pursuer, it will stop and turn to gaze, as if to ascertain whether he be following or not—a habit which operates to its disadvantage. It is mild and tractable; but when hard pressed, and infuriated by wounds, it uses its powerful horns with great effect, dropping on its fore-knees, and in this position advancing towards its enemy, and then suddenly darting forwards with great force and rapidity. The Hartebeest has rather an extensive range, being found in the Cape Colony as well as almost everywhere between it and the tropic of Capricorn. In the former locality, however, it is now only found on the extensive flats bordering upon the Caffre frontier.

Mr. Pringle has furnished us with the following description of the hartebeest (*Antilope bubalis*) which also came under his observation:—

"The hartebeest is one of the largest and handsomest of the antelope family. It is nearly of the same height as the gnu, but of a more slender and elegant shape. It was pretty numerous on the mountains around our settlement, and not unfrequently furnished us with game. It had many other enemies, I observed, and some of them only less formidable than man, the great destroyer. In the nooks of the narrow ravines, through which the wild game are wont to descend from the steep and stony mountains, for change of pasturage, or to drink at the fountains that ooze from the declivities, I have frequently found fresh skulls and horns of the hartebeest—those slight relics being all that remained to indicate that there the lion had surprised and rent his prey, and that the voracious hyæna had followed and feasted on the fragments, devouring even the bones, except the skull and a few other unmanageable portions. Though the common hyæna is no match in speed for the fleet

full-grown hartebeest, he probably picks up many of the young ones, and is always sure at least of the aged or infirm. The hyæna dog is probably more destructive. Too slender to attack such an animal as the hartebeest individually, these 'dogs of the desert' associate themselves in packs, to hunt down this and the other large antelopes. I once witnessed a chase of this kind, in which a noble hartebeest, hard pressed by a troop of these 'wildehonden' (as the boors call them), dashed across our garden and orchard ground and onwards among our huts, at noon-day. The wild dogs, on hearing the halloo that was raised by some of the people who witnessed this scene, stayed their quest for a brief space, as if alarmed; but, before we could get a gun or two to attack them, they vigorously renewed the chase down the valley, making a small circuit to avoid the houses; and, as the poor antelope seemed sore spent, I have no doubt that he would be speedily run down, notwithstanding the slight advantage he gained by our interference."

Another allied species is the Sassaby, or Bastard Hartebeest (*A. lunata*). Though this species (as it is stated in the catalogue of the South African Museum) is not known to occur so far south as the Colony, yet it is tolerably abundant in the neighbourhood of Lattakoo, and very much more so between 26° S. lat. and the tropic of Capricorn. In the latter locality especially it is found, like the hartebeest, in herds of from six to ten or even more individuals, and chiefly frequents flat and wooded districts. Where fire-arms are used, or where the necessities of natives have made them indefatigable in the chase, this animal is vigilant and shy; but in situations where it has been left in comparative peace, it regards the approach of man with curiosity, almost unmixed with fear; just discontinuing to feed, and raising its head to gaze, but never attempting to fly unless he approach very close. Its flesh is fully as valuable as that of the hartebeest.

CATOBLEPAS, H. Smith.—*Horns in both sexes, commencing in a dense mass covering the top of the forehead,*

whence they sweep downwards over the eyes, and then turn boldly upwards, terminating in sharp round points. Head heavy and ox-like; muzzle very broad and muscular; and the nostrils covered by a large moveable lid, continued from the skin of the muzzle, and capable of being opened or shut at pleasure. Suborbital sinus receiving to a small gland in the skin, concealed in a tuft of hair. No inguinal pores. Females with two teats. A full mane runs down the neck. Tail furnished with long hairs, and bushy.

The animals belonging to this generic group are remarkable for the singularity of their form, which partakes of that of the horse and buffalo. The head and horns are those of a buffalo; the eyes are large, wild, and expressive of a savage and vindictive disposition. The neck, with its mane, the tail, and the general contour of the body are those of the horse; the legs are well turned and vigorous, resembling those of the stag. The action and gallop of these animals (the Gnus) are so much like those of a horse, that a troop of them seen scouring the plain at a distance might easily be mistaken for zebras or quaggas, were it not for the difference of colour. Besides the mane down the back of the neck, the chaffron above the muzzle is furnished with a tuft of long, diverging, bristly hairs, and the chin and throat are also covered with hairs of a similar character, forming a shaggy beard, while a full mane flows down from the chest between the fore-limbs.

The Gnu (*Antilope Gnu*),

T'Gnu of the Hottentots. The gnu equals a well-grown ass in size, exceeding four feet in height, and is a native of the wild karroos of South Africa and the hilly districts, where it roams mostly in large herds, which migrate according to the season. The extent of its range in the interior regions is not known; as far, however, as travellers have penetrated, herds have been met and chased, for its flesh is prized as food both by

the natives and the colonists. They are, however, extremely wild, and not to be approached without difficulty. On the first alarm, away scours the troop, not in a tumultuous mass, but in single file following a leader. Their speed, as might be expected from the vigour and compactness of the body and limbs, is very great. Sometimes, however, when any object of apprehension appears they do not exert it, but plunge about, flinging out their heels, butting, and tossing up their heads, and exhibiting emotions of violent fury. (Fig. 117.) It is seldom, however, that they venture upon an attack, unless hard pressed or wounded, when they defend themselves with desperation; dropping on their knees, they dart forward upon their assailant with extraordinary force and im-

117.—Gnu.

petuosity, and unless he be cool and prepared he cannot escape his fate.

We are indebted to Mr. Pringle for the following account of this animal, as seen by him in its native regions :—

"The curious animal called *gnu* by the Hottentots, and *wilde beest* (*i. e.* wild ox) by the Dutch colonists, was an inhabitant of the mountains adjoining the Scottish settlement at Bavian's river, and I had therefore opportunities of very frequently seeing it both singly and in small herds. Though usually, and perhaps correctly, by naturalists ranked among the antelope race, it appears to form evidently one of those intermediate links which connect, as it were, the various tribes of animals in a harmonious system in the beautiful arrangement of nature. As the *hyæna dog*, or '*wilde hond*,' of South Africa connects the dog and wolf tribe with that of the hyæna, in like manner does the gnu form a graceful link between the buffalo and the antelope. Possessing the distinct features which, according to naturalists, are peculiar to the latter tribe, the gnu exhibits at the same time in his general aspect, figure, motions, and even the texture and taste of his flesh, qualities which partake very strongly of the bovine character. Among other peculiarities I observed, that, like the buffalo or the ox, he is strangely affected by the sight of scarlet; and it was one of our amusements, when approaching these animals, to hoist a red handkerchief on a pole, and to observe them caper about, lashing their flanks with their long tails and tearing up the ground with their hoofs, as if they were violently excited, and ready to rush down upon us; and then all at once, when we were about to fire upon them, to see them bound away, and again go prancing round us at a safer distance. When wounded, they are reported to be sometimes rather dangerous to the huntsman; but though we shot several at different times, we never witnessed any instance of this. On one occasion a young one, apparently only a week or two old, whose mother had been shot, followed the huntsman home, and was attempted to rear it on cow's milk. In a few days it