



CHES IN NATURAL HISTORY.

BOOK NO.

HISTORY

OF

THE MAMMALIA.

VOL. I.

ORDER—CARNIVORA:

FAMILIES—FELIDÆ AND URSIDÆ.

ORDER—MARSUPIALIA.

WITH NUMEROUS ILLUSTRATIONS.

IN SIX VOLUMES.

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HISTORY OF THE MAMMALIA.

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ORDER—RUMINANTIA.

s order, termed Pecora by Linnæus, is one of the natural of the primary groups into which the mammals are divided. It contains all those quadrupeds in which the cloven hoof, the act of rumination (chewing the cud) and the absence of incisors in the upper jaw co-exist together as data upon which to draw a line between this order and all other mammals. It is true that the Camel, or camel tribe, including the llamas, exhibit in this particular a departure from the rule, and exhibit a proximation to the Monotremata; nevertheless even the camels, in common with the Ruminants generally, possess those definite structural peculiarities from which there is no deviation; and which constitute a bond of union.

On a rapid glance at the distinguishing characteristics of this order will not, we trust, be unacceptable; certainly not out of place. Decidedly herbivorous, with lips adapted either for browsing, as the camel, giraffe, &c., or for grazing, as in the ox, the Ruminantia are always furnished with teeth, digestive organs, and all the other parts in accordance with their habits involved.

To begin with the teeth. We may observe that there are no incisors in the upper jaw, the hard gum maintaining the pressure of the lower incisors, which eight in number, with thin, broad edges; their position is not vertical, but oblique, so that their edges press directly against the gum, but rather their surface. The two central are in general the largest and the outermost on each side the smallest and most oblique. In the giraffe, however, the outermost is the largest, and it appears as if divided by a furrow. The molars are six on each side in both jaws: of these the first three are preceded by milk or deciduous teeth; the three posterior are originally permanent. Their surface is marked by two pairs of crescentic ridges. In the lower jaw these crescents have the convexity outward, in the upper, the reverse. These crescents as they wear down by use show a centre of bone surrounded by a ridge of enamel. Between the molars and incisors in the lower jaw intervenes a vacant space.

With respect to the camels, though the number of molars on each side above is really six, five only form a continuous series, and resemble molars in their position anterior to these continuous teeth, and separated by a considerable space, we find a tooth resembling in shape a stout short caninè, being of a simple conical figure; this is the first molar: it has been called a second caninè, but erroneously, the true caninè, which is large, stout, and pointed, being placed before it, a small interspace separating them. In the lower jaw the continuous molars are four, with a similar pointed and detached molar and canine; there being true canines, as well as canine-like molars, in both jaws. Incisors also are found in both jaws: four in the upper, but the two central are small and fall out early; the two lateral are permanent, and resemble canines in figure. In the lower jaw there are only six incisors, compressed, oblique, and pointed. Fig. 1 shows the dentition of the upper jaw in two views; Fig. 2, that of the lower, also in two views.

The dentition of the llamas closely approaches that of the camel; there are, however, in these animals

# SKETCH

OF THE

## HISTORY OF THE MAMMALIA.

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### ORDER—PACHYDERMATA.

The term Pachydermata was given to the present order by Cuvier, and refers to the thickness of the hide so generally conspicuous in the animals it comprehends; such, for example, as the elephant, hippopotamus, rhinoceros, hog, &c.

On looking at the order Pachydermata as a whole, we find it for the most part composed of genera between which there is a want of that intimate relationship which gives us an idea of unity or completeness. We see chasms in the gradation of existing forms, and are forced, as it were, by abrupt transitions from one genus to another, instead of passing through an intermediate series. Yet we are not rashly to infer the original plan and purpose of nature to have been destitute of unity. Far from it: happily the researches of the geologist have brought to light the fossil relics of many species, the extinction of which at some remote epoch has left blanks in the series—blanks, however, which we are thus enabled to fill up. And as these researches are continued and extended, we have reason to conclude that every hiatus caused by the absence of intermediate forms will become occupied. In the present order, indeed, the fossil relics of extinct species are peculiarly valuable and

interesting: among them are found not only the fossil remains of animals allied to existing species, as the fossil elephant or mammoth, fossil rhinoceroses, and others, but also of animals which have now no living representatives, and which constitute the types of distinct genera comprehending exclusively beings whose characters are to be drawn only from their recovered relics, they themselves having been long blotted out from among the "things that be." Such are the Mastodon, the Anoplotherium, the Palæotherium, the Toxodon, the Dinotherium, and many more.

The order Pachydermata is divided by Cuvier into three sections: the first (Proboscideans) includes the elephants and the extinct Mastodon; the second (ordinary Pachyderms), the hippopotamus, tapir, rhinoceros, and hog,—the Anoplotherium, Palæotherium, and many other extinct forms; the third (the solidungulose Pachyderms) includes the horse and ass. To these numbers add a fourth, namely, the aquatic, represented by the Dugong, Lamantin, &c.

The sketch of the Pachydermata would properly commence with the Elephant, but to that animal a volume has been devoted, and we therefore begin here with the Hippopotamus.

#### THE HIPPOPOTAMUS.

M. Desmoulins, from an examination of the skulls and skeletons of hippopotami from Senegal and from South Africa, considers that there are two distinct species, which he names respectively *H. Senegalensis* and *H. Capensis*. Very probably M. Desmoulins is correct, but as the habits of both species are precisely the same, and as the distinctive characters are founded on osteological minutiae only, we shall not treat them as different, more especially as the point is rather assumed than absolutely proved.

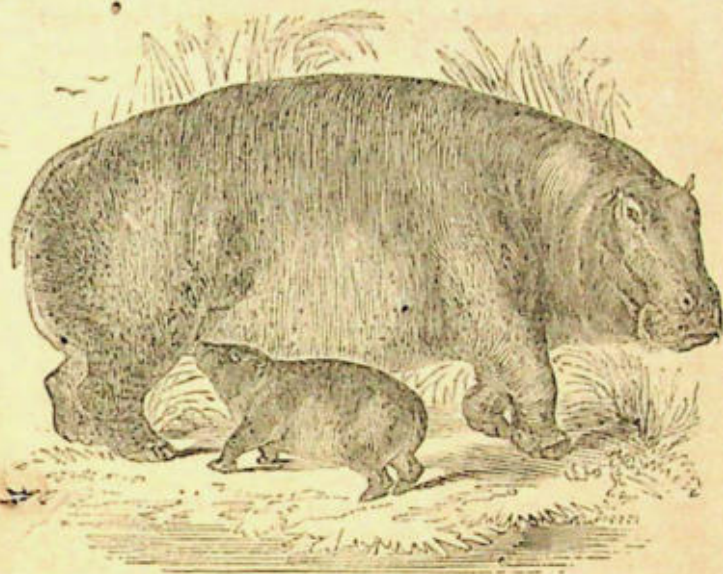
The hippopotamus is a native exclusively of Africa, where, though much more limited than formerly in the range of its habitat, it tenants the banks and beds of the larger rivers, and of the inland lakes from the Gariép to

the upper Nile and its tributary branches. It is, however, not restricted to these, for it is marine as well as fluviatile; and Dr. Smith thinks it difficult to decide whether it gives preference to the river or the sea for its abode during the day. When the opportunity of choosing the sea or the river existed, he found that some selected the one, and some the other.

Scarcely, if at all, inferior to the elephant in bulk, but much lower in stature from the shortness of the limbs, this massive animal presents us with the "ne plus ultra" of uncouth clumsiness and heavy solidity. Its body, like an enormous barrel supported on four thick pillars, almost touches the ground; the head is ponderous; the muzzle is swollen; and the great thick lips, studded with wire-like bristles, entirely conceal the projecting incisors of the lower jaw, and the huge curved tusks or canines; the mouth is wide; the nostrils open on the top of the swollen muzzle; and the eyes, which are very small, are situated high on the head; hence, when in the water, the animal by raising merely a small upper section of the head above the surface can both look around and breathe, the body remaining submerged. The ears are small and pointed; the tail is short, and furnished with a few wiry bristles. The toes, four on each foot, are tipped with small hoofs. The hide is naked, coarse, and of great thickness, being two inches deep or more on the back and sides. It is made into shields, whips, walking-sticks, &c. The whips known in Egypt under the name of korbadj are made of its skin, and form an important article of trade with the Sennaar and Darfour caravans. "After being taken off, the skin is cut into narrow strips, five or six feet long, and gradually tapering to a point; each strip is then rolled up so that the edges unite and form a pipe, in which state they are tied fast, and left to dry in the sun. To render them pliable, they must be rubbed with butter or grease. In Egypt, where they are in general use, and the dread of every servant and peasant, they cost from half a dollar to a dollar each. In colder climates, even in Syria, they become brittle, crack, and lose their elasticity."

Between the skin and the flesh is a layer of fat,<sup>9</sup> which is salted and eaten as a delicacy by the Dutch colonists of Southern Africa; indeed the epicures of Cape-Town, as Dr. Smith says, do not disdain to use their influence with the country farmers to obtain a preference in the matter of *sea-cow's speck*, as this fat is termed when salted and dried. The flesh also is excellent and in much request. The general colour of the hippopotamus is dusky brownish red, passing on the sides and limbs into a light purple, red, or brown; the under parts, the lips, and the eyelids are light wood-brown, with a tinge of flesh-colour; the hinder quarters and the under surface are freckled with spots of dusky brown; the hairs of the tail and ears are black, those on the muzzle yellowish-brown. The male far exceeds the female in size. The hippopotamus is gregarious in its habits, sagacious, wary, and cautious. It has been long driven away from the rivers within the limits of the Cape colony; but in remoter districts, where the sound of the musket is seldom heard, it abounds in every large river, and is comparatively fearless of man. "To convey," says Dr. Smith, "some idea of the numbers in which they were found in several of the rivers towards the tropic of Capricorn, it may suffice to state that in the course of an hour and a half a few members of the expedition party killed seven within gunshot of their encampment. Several other individuals were in the same pool, and might also have been killed, had it been desirable. One of the survivors was observed to make his escape to an adjoining pool, and in accomplishing that he walked with considerable rapidity along the bottom of the river, and with his back covered with about a foot of water." (Fig. 1.)

The hippopotami, according to Dr. Smith, feed chiefly on grass, resorting to situations near the banks of rivers which supply that food. "In districts fully inhabited by man," says Dr. Smith, "they generally pass the day in the water, and seek their nourishment during the night; but in localities differently circumstanced they often pass a portion of the day as well as the night upon dry land. In countries in which the night-time



1.—Female Hippopotamus and Young.

constitutes the only safe period for their leaving the water, they are generally to be seen effecting their escape from it immediately before dark, or are to be heard doing so soon after the day has closed, and according to the state of the surrounding country; they then either directly commence feeding, or begin a journey towards localities where food may exist. When previous to nightfall they may have been in pools or rivers, they are generally at once enabled to commence feeding on reaching the dry land; but when they may have passed the day in the sea, they require commonly to proceed some distance after leaving it, before they find the grass which appears congenial to their palate. It is not every description of grass that hippopotami seem to relish: they often pass over, in search of food, luxuriant green swards, which would strongly attract many other animals which feed upon grass. Besides having a peculiar relish for the grasses of certain situations, they appear to have a predilection for districts supporting brushwood; and,

owing to the latter peculiarity, they are often to be found wandering in localities on which but little grass exists, when they might have it in the neighbourhood in great abundance, but without the accompaniment of wood."

We learn from Mr. Salt, that in the district of Abyssinia watered by the Tacazze, a tributary to the Nile, hippopotami are very numerous. The Abyssinians term the animal Gomari. As Mr. Salt travelled along the line of the river, he found it interrupted by frequent overfalls and shallow fords. Between these shallows are holes or pits of vast depth, resembling the lochs and tarns in the mountain districts of Scotland and England. It is to these depths that the hippopotami delight to resort; and here Mr. Salt and his companions observed their actions, which he compares to the rolling of a grampus in the sea.

"It appears," observes the same traveller, "from what we have witnessed, that the hippopotamus cannot remain more than five or six minutes at a time under water, being obliged to come up to the surface at some such interval for the purpose of respiration."

It has generally been asserted that this huge, powerful, and, it should seem, inoffensive animal has no enemy in the brute creation audacious enough to contend with it. Some travellers, however, have attributed this boldness to the crocodile, describing combats between them, which in truth never take place, no enmity subsisting between the two animals. While Mr. Salt and his party were engaged shooting at the hippopotami, they frequently observed several crocodiles of an enormous size rise together to the surface of the same stream, apparently regardless of and disregarded by their still more enormous neighbours. Captain Tuckey, in his expedition to explore the Zaire or Congo, observed immense numbers of hippopotami and alligators in the same water—an association inconsistent with hostility.

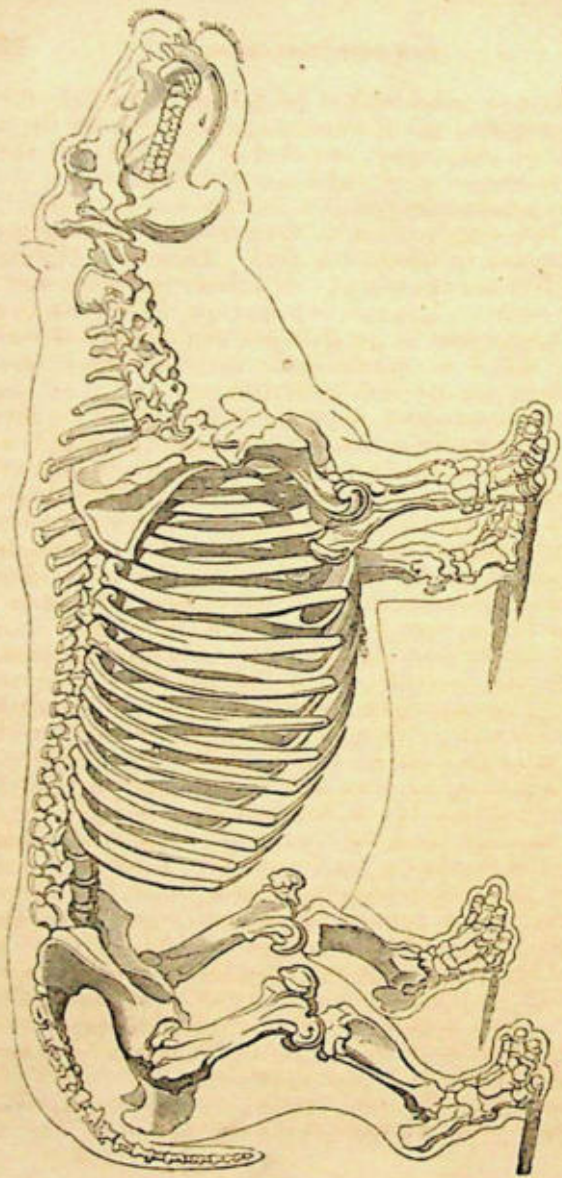
Burckhardt (see his 'Travels in Nubia') informs us that lower down the Nile, in Dongola, where there are neither elephants nor rhinoceroses, the hippopotamus is very common. The Arabic name for it is Barnik. It

is a dreadful scourge to the inhabitants, who lack the means of destroying it. Occasionally, but rarely, it is seen much farther north, even below the cataract of the Nile at Assouan.

The hippopotamus abounds in the Niger, where it was seen by Richard and John Lander. Clapperton observed them in the lake Muggaby, Bornou, and in the great lake Tchad and its tributary rivers.

Quiet and inoffensive, it is only when attacked that the hippopotamus becomes furious, and if hard pressed on land he rushes open-mouthed with the utmost desperation on his aggressor. If the party attacking the animal in his watery domicile be in a boat, their danger is extreme. Captain Owen ('Narrative of Voyages to explore the Shores of Africa, under Captain W. F. W. Owen') had many encounters with these animals. While examining a branch of the Temby river, in Delagoa Bay, a violent shock was suddenly felt from underneath the boat, and "in another moment a monstrous hippopotamus reared itself up from the water, and in a most ferocious and menacing attitude rushed open-mouthed at the boat, and with one grasp of its tremendous jaws seized and tore seven planks from her side; the creature disappeared for a few seconds, and then rose again, apparently intending to repeat the attack, but was fortunately deterred by the contents of a musket discharged in its face. The boat rapidly filled, but, as she was not more than an oar's length from the shore, they (the crew) succeeded in reaching it before she sank. The keel, in all probability, had touched the back of the animal, which, irritating him, occasioned this furious attack; and, had he got his upper jaw above the gunwale, the whole broadside must have been torn out. The force of the shock from beneath, previously to the attack, was so violent, that her stern was almost lifted out of the water, and Mr. Tambs, the midshipman steering, was thrown overboard, but fortunately rescued before the irritated animal could seize him.

Fig. 2 represents the skeleton of the hippopotamus, which is a ponderous frame-work in unison with the



2.--Skeleton of Hippopotamus.

vast weight of solid flesh to be sustained and the enormous strength of the muscles. The neck, though short, is longer in proportion than that of the elephant, and from the shortness of the limbs gives the animal the power of grazing the herbage.

The following account of the mode of attacking the hippopotamus in Dongola is from 'Travels in Nubia,' by Dr. Edward Rüppell, a careful observer and a trustworthy writer. Dongola is a narrow slip of country lying on both sides of the Nile, and extending southward from  $19^{\circ} 43'$  of north latitude for about 170 miles, measured along the course of the stream:—

“The harpoon with which the natives attack the hippopotamus terminates in a flat oval-shaped piece of iron, three-fourths of the outer rim of which are sharpened to a very fine edge. To the upper part of this iron one end of a long stout cord is fastened, and the other is tied to a thick piece of light wood. The hunters attack the animal either by day or by night, but they prefer daylight, as it enables them better to escape from the assaults of their furious enemy. One part of the rope with the shaft of the harpoon the hunter takes in his right hand; in the left he holds the rest of the rope and the piece of wood. Thus armed, he cautiously approaches the animal when he is asleep during the day on some small island in the river, or he looks for him at night, when the hippopotamus is likely to come out of the water to graze in the corn-fields. When the huntsman is about seven paces from the beast, he throws the spear with all his might, and if he is a good marksman the iron pierces through the thick hide, burying itself in the flesh deeper than the barbed point. The animal generally plunges into the water; and though the shaft of the harpoon may be broken, the piece of wood that is attached to the iron floats on the surface, and shows what direction he takes. There is great danger if the hippopotamus spies the huntsman before he can throw his spear. He then springs forward with the utmost fury, and crushes him at once in his wide open mouth; an instance of which took place while we were in the country.

“As soon as the animal is fairly struck, the huntsmen in their small canoes cautiously approach the floating wood, and, after fastening a strong rope to it, they hasten with the other end towards the large boat, which contains their companions. The huntsmen now pull the rope, when the monster, irritated by the pain, seizes the boat with his teeth, and sometimes succeeds in crushing or overturning it. In the mean time his assailants are not idle: four or five more harpoons are plunged into him, and every effort is made to drag the beast close up to the boat, so as to give him less room to plunge about in. Then they try to divide the *ligamentum nuchæ*\* with a sharp weapon, or to pierce his skull. Since the body of a full-grown hippopotamus is too bulky to be pulled out of the water without a great number of hands, they generally cut him up in the water and bring the pieces to land. In the province of Dongola not more than one or two of these animals are killed in a year: from 1821 to 1823 inclusive, nine were killed, out of which number we despatched four. The flesh of a young hippopotamus is very good; but the full-grown ones are generally too fat. They weigh as much as four or five oxen. The hide is made into excellent whips, and will furnish from 350 to 500. No use is made of the teeth.

“One of the hippopotami which we killed was a very old fellow, and of an enormous size, measuring  $13\frac{1}{2}$  French feet from the nose to the extremity of the tail. His incisive teeth were 26 French inches long, measured from the root to the point, along the outer bending. We fought with him for four good hours by night, and were very near losing our large boat, and probably our lives too, owing to the fury of the animal. As soon as he spied the huntsmen in the small canoe, whose business it was to fasten the long rope to the float, he dashed

\* The suspensory ligament (an elastic substance), which holds the heads of quadrupeds in their places, so as to allow a free movement downwards, is particularly strong in all those whose heads are of great weight.

at them with all his might, dragged the canoe with him under the water, and smashed it to pieces. The two huntsmen with difficulty escaped. Of twenty-five musket-balls aimed at the head from a distance of about five feet, only one pierced the skin and the bones of the nose: at each snorting the animal spouted out large streams of blood on the boat. The rest of the balls stuck in the thick hide. At last we availed ourselves of a swivel; but it was not till we had discharged five balls from it at the distance of a few feet, and had done most terrible damage to the head and body, that the colossus gave up the ghost. The darkness of the night increased the danger of the contest, for this gigantic animal tossed our boat about in the stream at his pleasure; and it was at a fortunate moment indeed for us that he gave up the struggle, as he had carried us into a complete labyrinth of rocks, which, in the midst of the confusion, none of our crew had observed.

“For want of proper weapons the natives cannot kill a hippopotamus of this size: all they can do to drive him from their fields is to make a little noise in the night, and to keep up fires at different spots. These animals, from their voracity, are a curse to a whole district; and in some places they are so bold that they will not quit the fields which they are laying waste till a great number of men come out with poles and loud cries to attempt to drive them away.”

Four fossil species of hippopotamus are described by Cuvier; of one (*H. antiquus*) the relics are widely distributed, and are particularly abundant in the Val d'Arno, Italy, intermixed with those of the elephant and rhinoceros.

#### THE RHINOCEROS.

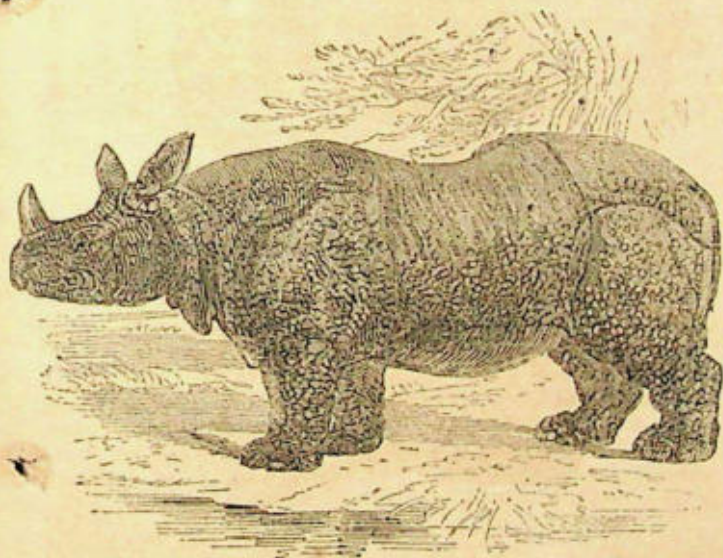
This genus contains six living and well-established species, as far as naturalists are at present able to determine, and several fossil species, of which the relics occur in the same strata as those of the fossil elephant.

The existing species are confined to the hotter regions of the Old World, and are divided between Africa and



3.—Rhinoceros.

India, including the islands of Java and Sumatra. It is in the land of the elephant and the hippopotamus that the rhinoceros wanders in fearless confidence, as if aware of his enormous powers and the advantage of his weapons of defence. One species (*Rh. Indicus*: Figs. 3, 4, 5, and 7) is peculiar to continental India beyond the Ganges, Siam, and Cochin-China; one (*Rh. Java-nus*: Fig. 8) is a native of Java; and one with two horns (*Rh. Sumatranus*: Fig. 10), of Sumatra. Three two-horned species are indigenous in Africa, viz. the common two-horned or black rhinoceros (*Rh. bicornis*, Linn.; *Rh. Africanus*, Cuv.: Figs. 11 and 12); the white rhinoceros (*Rh. simus*: Figs. 14 and 15); and the keitloa (*Rh. Keitloa*: Fig. 13), discovered by Dr. Smith during his expedition into the interior. We may here add that, though Bruce and Salt notice the existence



4.—Indian Rhinoceros.



5.—Indian Rhinoceros.

of a two-horned rhinoceros in Abyssinia different from the common species of South Africa,\* there is some

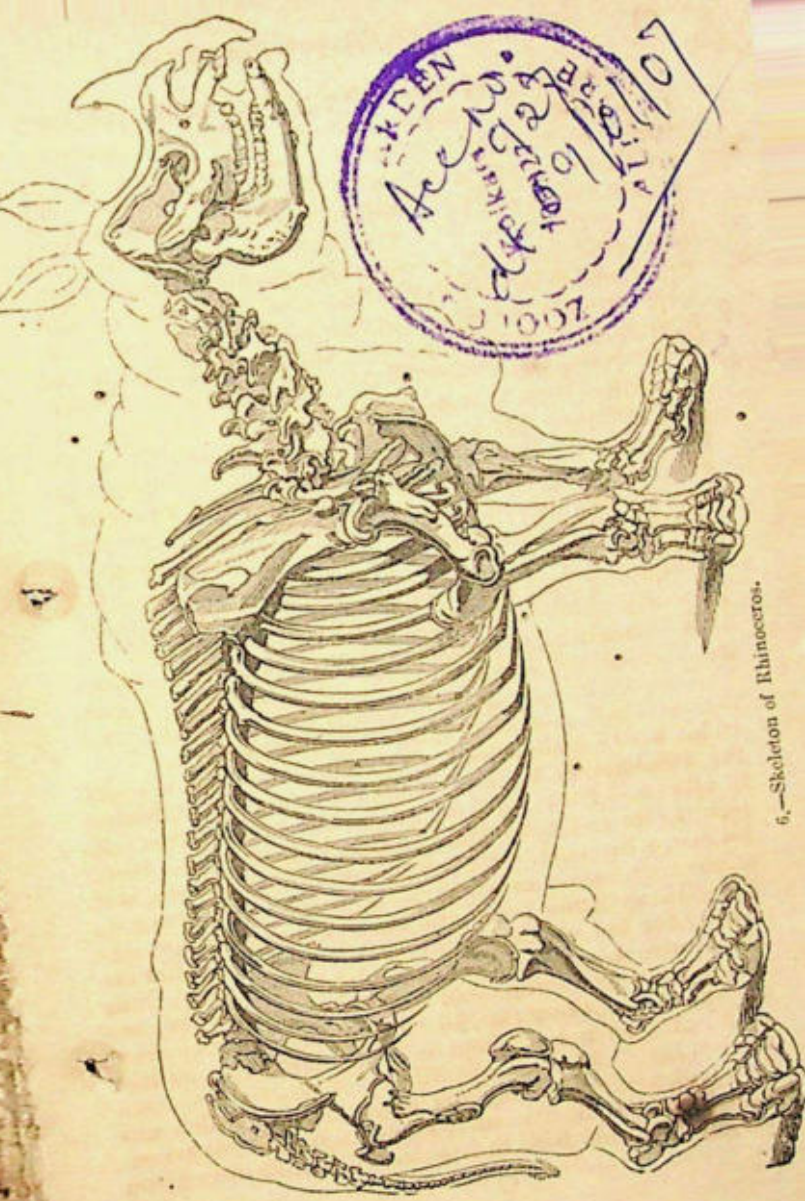
\* A pair of horns brought by Salt from Abyssinia, and now in the museum of the Royal College of Surgeons, more nearly resemble those of the keitloa than of the *Rh. bicornis*; and Dr. Smith considers a pair brought by Major Denham from North Africa to be different again, and unlike those of any other species. Clubs of rhinoceros-horn, of about three feet in length, have been brought from Dahomy, Western Africa. It is evident that there are two or three species in Africa with which naturalists are not acquainted.

reason to believe in the existence of a single-horned species in that region. Bruce states that a one-horned rhinoceros is found towards Cape Gardafui, according to the accounts of the natives in the kingdom of Adel. Accounts of such an animal were received by Dr. Smith from the natives in the interior of South Africa, who represented it as living far up the country; moreover Burekhardt alludes to a one-horned species in the territory above Sennaar, and states that the inhabitants there give it the name of the "mother of the one horn." According to this traveller, its northern boundary, like that of the elephant, is the range of mountains to the north of Abou Huaze, two days' journey from Sennaar. The hide of this animal is manufactured into shields, which have an extensive sale; the material of the horn is also sold, and at a high price, Burekhardt having seen four or five Spanish dollars paid for a piece four inches long and one inch thick. Was the one-horned rhinoceros seen by Strabo at Alexandria this species or the common Indian?—and the same question applies to the one-horned rhinoceros, which, with a hippopotamus, was given by Augustus, in the celebration of his triumph over Cleopatra, to be slain in the Circus; which animals, Dion Cassius says, were then first seen and killed at Rome—an assertion perfectly erroneous as it respects the rhinoceros, if it was the common Indian species, for Pliny, in his eighth book, alluding to the games of Pompey, mentions the one-horned rhinoceros (Indian, it is presumed) as then exhibited ("Iisdem ludis, et rhinoceros unius in nare cornu, qualis sæpè visus"). With respect to the two-horned African species, it was also exhibited in Rome; and had learned critics known anything of natural history, the line in Martial ("namque gravem *gemino cornu* sic extulit ursum") would not have given rise to so many futile disquisitions and attempted corrections. Pausanias describes a two-horned rhinoceros under the name of Æthiopian Bull. Two individuals of the same species appeared at Rome under the Emperor Domitian, on some of whose medals was impressed their figure; others were exhibited under

Antoninus, Heliogabalus, and Gordian III. Martial lived in the time of Domitian, and the rhinoceros "gemino cornu" was doubtless seen by him.

The animals of the present genus are all remarkable for the massiveness of their form and the clumsiness of their proportions; they are, however, more prompt and rapid than might be at first supposed, and when attacked they rush on their foes with headlong impetuosity. The body is of great bulk, and protuberant at the sides; the neck is short and deep; the shoulders are heavy, the limbs thick; the feet are divided into three toes encased in hoofs. The skin is thick and coarse, with a knotty or tuberculous surface, and destitute, or nearly so, of hairs. In the common Indian species it is disposed in large folds, especially on the neck, shoulders, haunches, and thighs. The eyes are small, placed nearer the nose than in other quadrupeds, and high towards the upper surface of the skull; the ears are moderate and erect. The head is large and ponderous: it is elevated between the ears, whence it sweeps with a concave line to the nasal bones, which rise in the form of an arch to support the horn (see skeleton, Fig. 6). The upper lip is soft, flexible, sensitive, capable of being protruded, and used to a certain degree as an organ of prehension.

But that which gives most character to the head of the rhinoceros is its horn, single in some species, double in others. This organ is of an elongated, recurrent, conical figure, arising from a broad, limpet-shaped base, seated on the nasal bones, which are of a thickness and solidity not to be found in other races of quadrupeds. They form a vaulted roof, elevated in a remarkable degree above the intermaxillary bones, containing the incisor teeth, and their upper arched surface is rough with numerous irregularities and depressions; and here we may pause, to reflect on the advantages gained by their form and structure. They have not merely to sustain the weight of the horn, no trifle in itself, but to resist the shock occasioned by the violent blows which the animal gives with the weapon upon various occasions. Hence, conjoined with their solidity, that form is given



6.—Skeleton of Rhinoceros.

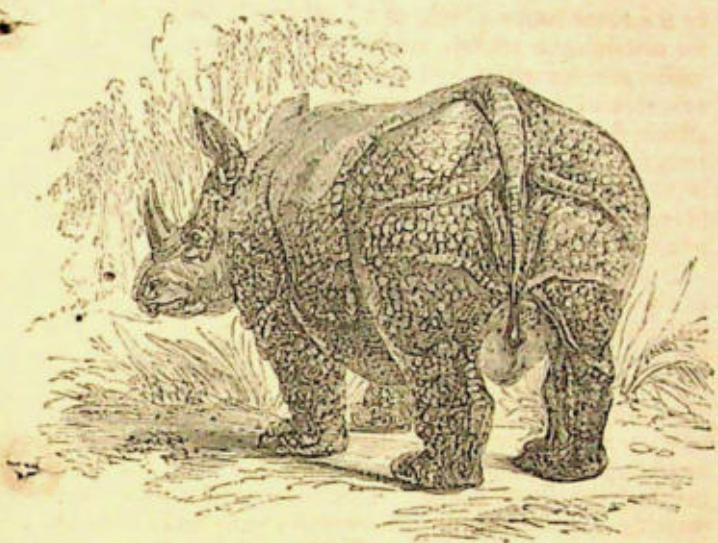
to the nasal bones which, of all others, is best calculated for sustaining a superincumbent weight or sudden jars; while the rugosities and depressions tend to the firmer adhesion of the skin, to which the horn is immediately attached. In the two-horned species the posterior horn rests on the os frontis. The nasal horn of the rhinoceros is a solid mass, structurally composed of agglutinated fibres analogous to hair, and much resembling those into which whalebone is so easily separable.

It has been asserted by some travellers that the horns of the African species are moveable, and that the animal rattles them against each other: this, however, is a mistake—they are firmly fixed. The nostrils are on each side of the upper lip; the tongue is perfectly smooth, contrary to what is alleged by many of the older writers, who describe it to be covered with spines, and capable of lacerating the skin. The senses of smell and hearing are very acute. Dentition variable: canines wanting. In the Indian rhinoceros the formula is as follows:—Incisors,  $\frac{4}{4}$ ; molars,  $\frac{7-7}{7-7} = 36$ .

#### THE INDIAN RHINOCEROS

In his native regions leads a tranquil, indolent life: like the elephant, he gives preference to the marshy borders of lakes and rivers, or swampy woods and jungles, delighting to roll and wallow in the oozy soil, and plaster his skin with mud. He is also fond of the bath, and swims with ease and vigour. The splendid animal in the gardens of the Zoological Society may be often seen during the hot weather of summer enjoying the bath in the paddock appropriated for his exercise, or rolling and wallowing in the mud, or basking luxuriously, half in, half out, of the water, like a huge hog, uttering every now and then a low grunt of self-complacent satisfaction. (Fig. 7.)

Sluggish in his habitual movements, the rhinoceros wanders through his native plains with a heavy step, carrying his huge head so low that his nose almost touches the ground, and stopping at intervals to crop some



7.—Indian Rhinoceros.

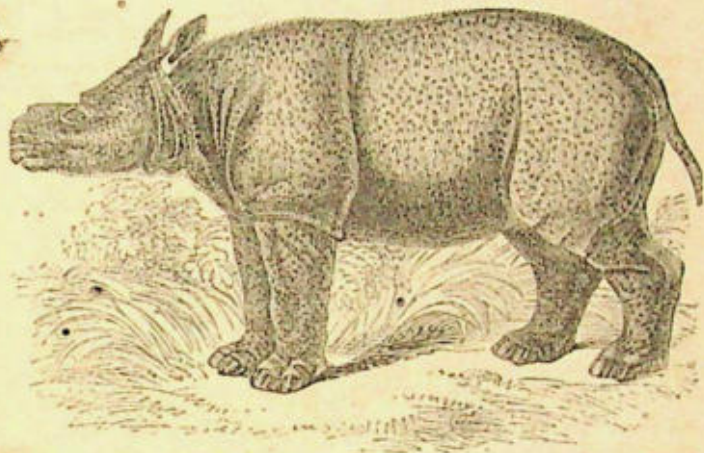
favourite plant, or, in playful wantonness, to plough up the ground with his horn, throwing the mud and stones behind him. The jungle yields before his weight and strength, and his track is said to be often marked by a line of devastation. When roused the rhinoceros is a most formidable antagonist, and such is the keenness of his senses of smell and of hearing, that, unless by very cautiously approaching him against the direction of the wind, it is almost impossible to take him by surprise. On the appearance of danger the rhinoceros generally retreats to his covert in the tangled and almost impenetrable jungle, but not always, and instances are on record in which, snuffing up the air and throwing his head violently about, he has rushed with fury to the attack, without waiting for the assault. There are, in fact, seasons in which the rhinoceros is very dangerous, and attacks every animal with impetuosity that attracts his notice or ventures near his haunts, even the elephant himself.

From the earliest times the horn of the Indian rhinoceros (the observation applies to other species also) has been regarded either as an antidote against poison or as efficacious in detecting its presence, as well as useful in curing disease. The Indian kings made use of it at table, because, as was believed, "it sweats at the approach of any kind of poison whatever." Goblets made of it are in high estimation; these are often set with gold or silver, and sell for large sums: when poison is poured into them, the liquor, it is said, betrays its noxious qualities by effervescing till it runs over the brim: water drunk from them, or from the cup-like hollow at the base of the horn, is regarded as medicinal. In the latter case the water is to be stirred in the hollow with the point of an iron nail till it becomes discoloured, when the patient must drink it.

The strong deep folds into which the coarse skin is gathered in the cheeks, neck, shoulders, haunches, and thighs, are distinguishing characters of the Indian rhinoceros. The general colour of the skin is dusky black, with a slight tint of purple. Mr. Hodgson ('Proceedings of the Zoological Society,' 1834) states that the female goes from 17 to 18 months with young, and produces one at a birth: he adds also, "It is believed that the animal lives for 100 years; one taken mature was kept at Katmandoo for 35 years without exhibiting any symptoms of approaching decline. The young continues to suck for nearly two years: it has for a month after birth a pink suffusion over the dark colour proper to the mature hide." The female is desperate in the protection of her young.

#### THE JAVANESE RHINOCEROS (*Rh. Javanus*).

As far as is ascertained, this species is confined to the island of Java, where it is called Warak. In the character of the incisor teeth, and the horn being single, it agrees with the Indian species; but it is a less bulky animal, and, in proportion, more elevated in the limbs; the folds of the skin are both less numerous, less deep, and



8.—Javanese Rhinoceros.

also differently arranged: the surface of the skin is divided into small polygonal tubercles with a slight central depression in each, from which arise a few short bristly hairs. (Fig. 8.) In its habits this species is gregarious; its range on the island extends from the level of the ocean to the summits of mountains of considerable elevation—the latter situations are preferred; its retreats in these mountains are to be discovered by deeply excavated passages worked out on their declivities. When met with, or otherwise disturbed, it quietly retires, being very mild and peaceable. Night is the principal season of its activity, and it often commits considerable damage in the plantations of coffee and pepper. The horns and skin are employed for medicinal purposes by the natives. Dr. Horsfield ('Zoological Researches in Java') gives a detailed account of one of these animals which was kept at Suracarta. He says that "by kind treatment it soon became domesticated to such a degree, that it permitted itself to be carried in a large vehicle, resembling a cart, to the capital of Suracarta. I saw it during its conveyance,

and found it perfectly mild and tractable. At Suracarta it was confined in the large area or square which bounds the entrance to the royal residence. A deep ditch about three feet wide limited its range, and for several years it never attempted to pass it. It was perfectly reconciled to its confinement, and never exhibited any symptoms of uneasiness or rage, although on its first arrival harassed in various ways by a large proportion of the inhabitants of a populous capital, whose curiosity induced them to inspect the stranger of the forest. Branches of trees, shrubs, and various twining plants were abundantly provided for its food: of these the species of *Cissus*, and the small twigs of a native fig-tree, were preferred. But plantains were the most favourite food; and the abundant manner in which it was supplied with these by the numerous visitors tended greatly to make the animal mild and sociable. It allowed itself to be handled and examined freely, and the more daring of the visitors sometimes mounted on its back. It required copious supplies of water, and, when not taking food or intentionally roused by the natives, it generally placed itself in the large excavations which its movements soon caused in the soft earth that covered the allotted space. The animal rapidly increased in size: in the year 1817, having been confined at Suracarta about nine or ten months, the dimensions were nine feet in length, and above four feet three inches in height at the rump. In 1821 it had acquired the height of five feet seven inches.

"This information I received from my friend Mr. Stavers, who is now in England on a visit from the interior of Java; and he favoured me further with the following detail, which completes the history of the individual.

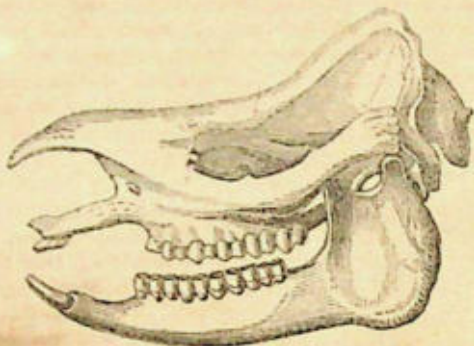
"Having considerably increased in size, the ditch of three feet in breadth was insufficient for confining it; but, leaving the enclosure, it frequently passed to the dwellings of the natives, destroying the plantations of fruit-trees and culinary vegetables which always surround them. It likewise terrified those natives that accidentally

met with it, and w. were unacquainted with its appearance and habits. But it showed no ill-natured disposition, and readily allowed itself to be driven back to the enclosure like a buffalo. The excessive excavations which it made by continually wallowing in the mire, and the accumulation of putrefying vegetable matter, in the process of time became offensive at the entrance of the palace, and its removal was ordered by the Emperor to a small village near the confines of the capital, where, in the year 1821, it was accidentally drowned in a rivulet.

“The rhinoceros lives *gregarious* in many parts of Java. It is not limited to a peculiar region or climate, but its range extends from the level of the ocean to the summit of mountains of considerable elevation. I noticed it at Tangung near the confines of the Southern Ocean, in the districts of the native princes, and on the summit of the high peaks of the Priangan Regencies; but it prefers high situations. It is not generally distributed, but is tolerably numerous in circumscribed spots distant from the dwellings of man, and covered with a profuse vegetation. On the whole, it is more abundant in the western than in the eastern districts of the island. Its retreats are discovered by deeply excavated passages which it forms along the declivities of mountains and hills. I found these occasionally of great depth and extent. In its manners the rhinoceros of Java is comparatively mild. It is not unfrequently met in the wilds by Europeans and natives. No instance of its showing a disposition to make an attack has come to my knowledge: being the largest animal in Java, its passions are not roused, as in many parts of India, by contentions with the elephant. It is rarely seen in a domestic state, but is occasionally decoyed into pits and destroyed. Our animal rambles chiefly at night, and often occasions serious injury to the plantations of coffee and pepper which are laid out in the fertile districts selected for its retreats. The horns and skin are employed for medicinal purposes by the natives.”

The Javanese rhinoceros was known to Bontius, who

wrote on the productions of that island in 1629. Fig. 9 represents the skull of this species, which is more elongated in proportion and less heavily made than that of the Indian animal.



9.—Skull of Javanese Rhinoceros.

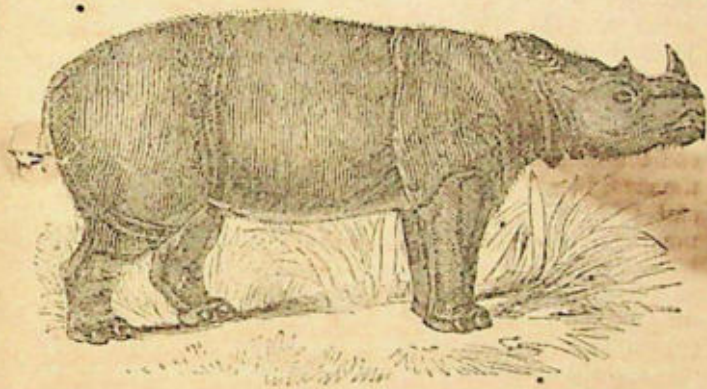
### THE SUMATRAN RHINOCEROS

(*Rh. Sumatranus*, Raffles)

Was first described by Mr. Bell, surgeon in the service of the East India Company, at Bencoolen ('Philosophical Transactions,' 1793); but it appears to have been indicated previously by Mr. C. Miller, long resident in Sumatra (Pennant's 'History of Quadrupeds,' 3rd ed., vol. i.). The head is more elongated than in the other two species, and there are two horns on the nose; the neck is thick and short, the limbs massive; the skin is rough and black, and covered with short hair; the folds are very inconsiderable, but are most distinct on the neck, shoulders, and haunches. (Fig. 10.) The female is stated to have a heavier head than the male. The number of incisors is four in each jaw, but of these the lateral ones are very small and soon fall out; hence Bell and others supposed the number to be only two.

The Sumatran rhinoceros is by no means bold or

savage; one of the largest size has been seen to run away from a single wild dog. Its native name is Badak, whence the term Abadia, or Abath, applied to the Indian rhinoceros by our early navigators. Sir S. Raffles says that, besides this species, there is another animal in the forests of Sumatra, never noticed, which in size and character nearly resembles this rhinoceros, but which is said to have a single horn, and to be distinguished by a narrow white belt encircling the body. The natives of the interior term it Tenuu, which, at Malacca, is the name



10.—Sumatran Rhinoceros.

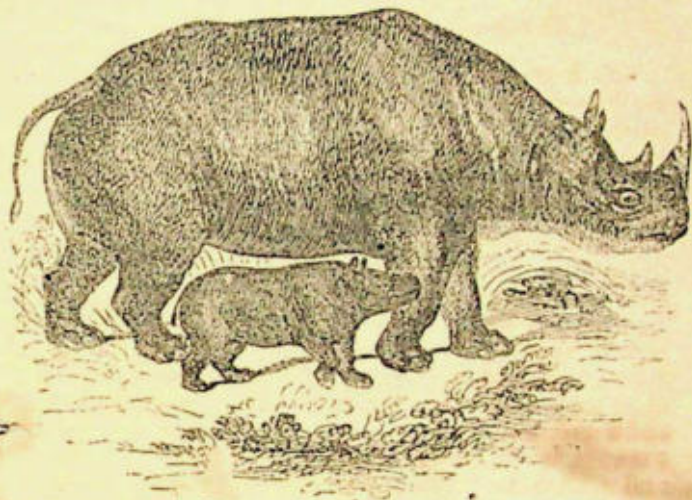
of the Tapir; but in Sumatra the name of the Tapir is Gindoi and Babialu. In the interior, however, where different tribes shut out from general communication speak different dialects, it is probable that the term Tenuu may be the name applied by some, as at Malacca, to the tapir, and hence would the confusion arise: for, from the description, notwithstanding the assertion that it possesses a horn, we cannot help regarding this Tenuu of the forest of the interior as the tapir.

Of the African species of rhinoceros we may first notice the

## BLACK OR COMMON AFRICAN RHINOCEROS

(*Rh. bicornis*, Linn.; *Rh. Africanus*, Cuv.).

This huge animal, though driven from the precincts of the colony, is still extensively spread throughout the southern regions of Africa. When the Dutch first formed their settlement on the shores of Table Bay, this rhinoceros was a regular inhabitant of the thickets which clothed the lower slopes of the mountain: but it has retired, and continues to retire, before the advance of colonization and the gun of the hunter. This species differs from the Indian, not only in the possession of a double horn, but in the absence of massive folds of skin, and in wanting the incisor teeth. The skin is thick, coarse, scabrous, and forms a deep furrow round the short thick neck; the head is heavy; the eyes are small, and the skin round them, and on the muzzle, and before the ears, is wrinkled; the upper lip is slightly produced, and prehensile. The anterior horn is long, fibrous at the base, hard, and finely polished at the point; the posterior horn is short and conical. General colour yellowish brown, with tints of purple upon the sides of the head and muzzle; eyes dark brown. Length about eleven feet. A few black hairs fringe the edge of the ears and the tip of the tail. (Fig. 11.) This animal feeds upon brushwood, and the smaller branches of dwarf trees, "from which circumstance," says Dr. Smith, "it is invariably found frequenting wooded districts, and in those situations its course may be often traced by the mutilations of the bushes. The mass of vegetable matter consumed does not appear to be in proportion to the bulk of the animal: indeed, as it feeds but slowly, and passes much of its time in idleness, it must be regarded as a very moderate eater, and, considering that it appears to be fastidious in the choice of its food, it is fortunate for its comfort that it does not require more nourishment." Of the senses of the rhinoceros, those of hearing and smell are very acute, and aid the animal more than his sight in the discovery of danger, the bulk of the body screening ob-



11.—Black Rhinoceros and Young.

jects not immediately before the eyes. "As these animals depend much upon smell for their existence and safety, it is necessary to advance upon them from the iceward side, if the aim be to get close without being discovered. In pursuit they also trust for guidance to the same sense, and may be heard forcibly inspiring the air, when they have lost the scent of the object they are following. The ticks and other insects with which they are covered furnish for them another source of intelligence, inasmuch as they attract a number of birds, which sit quietly picking them off when nothing strange is in sight, but fly away when any object excites their fear. So well does the rhinoceros understand this, that he proceeds feeding with the greatest confidence while the birds continue perched upon his back; but the moment they fly, the huge animal raises his head and turns it in all directions to catch the scent. Whether he accom-

plishes this or not, he generally feels so uncertain of his position, that he moves to some other locality." The same observations apply to the other African species. (Fig. 12.) When disturbed or attacked the rhinoceros becomes furious, and especially when wounded: he then rushes towards his foe, and, if he can get the hunter once within his sight, the escape of the latter, unless he exert great presence of mind, or the well-directed shot of a companion stop the animal in his career, is very doubtful. The best plan is to wait till the enraged beast approaches, and then step aside suddenly, where some bush or inequality of the ground may afford a shelter, and give time to the hunter for reloading his gun before the rhinoceros gets sight of him again, which fortunately it does slowly and with difficulty. Travellers in the regions



12. — African Rhinoceros.

frequented by this animal are not safe during the night from its attacks. It appears to be excited by the glow of a fire, towards which it rushes with fury, overturning every obstacle. It has, indeed, been known to rush with such rapidity upon a military party lodged among the bush covering the banks of the Great Fish River, that before the men could be aroused it had severely injured two of them, tossed about and broken several guns, and completely scattered the burning wood. Le Vaillant, in his animated account of a rhinoceros-hunt, describes the enraged and wounded animals as ploughing up the ground with their horns, and throwing a shower of pebbles and stones around them; and Dr. Smith says that they are sometimes seen to plough up the earth for several paces with the front horn when not enraged, but for what object he could not discover. The native (Bechuana) name of this species is Borili. The following is Le Vaillant's narrative:—"In the midst of this immense menagerie, the variety of which kept me in a continual state of enchantment, I was surprised not to find that prodigious number of rhinoceroses which had been mentioned to me by the people of Haripa's horde.

"One day, however, Klaas, who was always concerned in every matter of importance, and the first to communicate agreeable intelligence, came in great haste to my tent to inform me that he had observed at some distance from my camp two of these animals standing quietly close to each other in the middle of the plain, and that I had it in my power to enjoy the pleasure of the finest hunt I had ever yet experienced.

"The hunt indeed promised to be amusing, but, independently of danger, I foresaw that it was likely to be attended with difficulties. To attack two such formidable enemies it was necessary to use great precaution, and that we should approach them in such a manner as that they might neither see nor smell us, which is always very difficult. I at first proposed to form a ring which should surround them on all sides, and to advance upon them, gradually contracting the circle, so as to unite the moment

we were about to commence our attack ; but the savages assured me that with these animals this plan was impracticable. I gave myself up therefore entirely to their direction, and we set out armed alike with a good fuscé and with the necessary courage. All my hunters wished to be of the party, and each proposed to display the greatest prowess. I caused two of my strongest dogs to be led in a leash, in order that they might be let loose on the rhinoceroses in case it should be found necessary. We were obliged to make a long circuit to gain the lee side of them, lest they should smell us ; and we reached the river, the course of which we followed under cover of the large trees that grew on its banks, when Klaas soon made us observe the two animals at about the distance of a quarter of a league in the plain. As one of them was much larger than the other, I supposed them to be a male and female. Motionless by the side of each other, they were still in the same posture in which Klaas had first seen them, but they stood with their noses to the wind, and consequently presented to us their rumps.

“ It is the custom of these animals when thus at rest to place themselves in the direction of the wind, in order that they may discover by their smell what enemies they have to dread. From time to time, however, they move their heads round to take a look behind them, and to be assured that they are safe on all sides, but it is only a look, and they soon return to their former position.

“ We were already deliberating on the dispositions to be made for commencing the attack, and I was giving some orders to my company, when Jonker, one of my Hottentots, requested that I would permit him to attack the two animals alone as a *vekruyper*.

“ My readers will here recollect that, when I foolishly attempted to cross the Elephant's river, near its mouth, on the trunk of a tree, Jonker was one of the swimmers who saved my life, and that in return, at the desire of his companions, I raised him to the rank of hunter. At that time he was entirely a novice in this exercise, but I have already remarked that he afterwards became a most excellent shot, and surpassed all the rest

of my hunters, particularly in the art of creeping. I have before observed that hunting in Africa has no resemblance to that in Europe; that to get within the reach of certain wild animals we must approach them without being perceived; and that it is impossible to get near them but by creeping on the belly. Those who have acquired this art are called *vekruypers*, and it was in this quality that Jonker asked leave to attack alone the two rhinoceroses, assuring me that he would acquit himself to my satisfaction.

“As his design would not prevent the execution of our plan, and as, in case his particular attack should not succeed, it would not impede our general one, I granted his request. He then stripped himself naked, and, taking his fusee, proceeded towards the animals, creeping on his belly like a serpent.

“In the mean time I pointed out to my hunters the different posts they were to occupy. They repaired to them by circuitous ways, each accompanied by two men. As for me, I remained on the spot where I was with two Hottentots, one of whom held my horse and the other my dogs; but, to avoid being seen, we posted ourselves behind a bush.

“In my hand I held a glass, which had often enabled me to see the operation of stage machinery and the effect of our theatrical decorations. How changed the scene! At this moment it brought before me two hideous monsters, which at times turned towards me their frightful heads. Their movements, which indicated fear and observation, soon became more frequent, and I was apprehensive they had heard the agitation of my dogs, who, having discovered them, made efforts to escape from the keeper, and rush upon them. Jonker still kept slowly advancing, but with his eyes fixed on the two animals. If he saw them turn their heads, he stopped, and remained motionless; one would have taken him for a large stone, and indeed in this respect I myself was deceived. He continued creeping with various interruptions for more than an hour. At length I saw him proceed towards a large bush of *cuphorbia*, which was only 200 paces from the

animals. Being certain when he reached it that he could conceal himself there without being seen, he rose up, and, casting his eyes everywhere around, to see whether his comrades had arrived at their posts, he made preparations for firing. During the time he was creeping along I had followed him with my eye, and in proportion as he advanced I felt my heart beat with involuntary palpitation.

"This palpitation, however, increased when I saw him so near the animals, and just upon the point of firing at one of them: what would I not have given at that moment to have been in the place of Jonker, or at least by his side, that I might have brought down also one of these savage monsters! I waited with the utmost impatience the report of the gun, and I could not conceive what prevented him from firing, but the Hottentot who stood near me, and who was able by the bare sight to distinguish him as perfectly as I could with my glass, informed me of his design. He told me that Jonker did not fire because he was waiting till one of the rhinoceroses should turn round, that he might if possible take aim at his head, and that on the first motion they made I should hear the report.

"Presently, the largest of the two, having looked behind, was immediately fired at; being wounded, he sent forth a horrid cry, and, followed by the female, ran furiously towards the place whence the noise had proceeded. I found my heart now agitated by the most violent emotion, and my fear was carried to its utmost extent. A cold sweat diffused itself over my whole body, and my heart beat with such force as to prevent me from breathing. I expected to see the two monsters tear up the bush, tread the unfortunate Jonker under their feet, and tear him to pieces; but he had thrown himself down with his belly on the ground, and this stratagem succeeded. They passed close by his side without perceiving him, and came straight towards me. My fear now gave place to joy, and I prepared to receive them; but my dogs, animated by the report they had heard, became so restless on their approach, that, being

unable to check them, I ordered them to be let loose, and encouraged them to the attack. When the animals saw this, they instantly turned aside, and proceeded towards another of the hunters placed in ambush, from whom they received a second fire, and then to another, from whom they received a third; my dogs, on the other hand, harassed them prodigiously, which still increased their rage; they kicked at them in the most terrible manner, ploughed up the plain with their horns, and, digging furrows in it seven or eight inches in depth, threw around them a shower of pebbles and stones.

“During this time we all kept approaching in order to surround them more closely, and to unite against them our forces. The multitude of enemies by which they found themselves enclosed rendered them completely furious. The male, however, suddenly stopped, and, turning round to attack the dogs, endeavoured to rip up their bellies with his horn, and while he was engaged in pursuing them the female quitted him and made her escape. I was highly pleased at her flight, which I considered a fortunate circumstance; for it is certain, notwithstanding our number and our arms, we should have been much embarrassed by two so formidable adversaries. I must even confess that without the assistance of my dogs we should not have been able to combat, but with great hazard and danger, the one that remained. The bloody traces which he left wherever he went announced that he had received more than one wound; but, reduced to despair, he only defended himself with the greater obstinacy.

“After a fruitless attack, which lasted for some time, he began to retreat, and seemed as if desirous of gaining some bushes, apparently with a view of finding shelter, and to prevent his being harassed but in front. I guessed this stratagem, and, in order to disappoint him, I rushed towards the bushes, and made a sign to the two hunters who were nearest to me to advance there also. He was only thirty paces from us when we took possession of the post; accordingly, we all at the same time presented our pieces, and, discharging our three shots,

he instantly fell, and was never after able to rise. I beheld his fall with the utmost satisfaction : as a hunter and a naturalist it afforded me a double triumph.

“ Though mortally wounded, the animal still continued to defend himself when lying on the ground as he had done when on his legs ; with his feet he threw around him heaps of stones, and neither we nor our dogs durst venture to approach him.

“ I wished to put an end to his torment by firing one more ball, and was making preparations for the purpose, when my people entreated me to desist. As I could not ascribe their request to pity, I was at a loss to conceive what could be their motive. I have already said that all the savage tribes, and even the people at the Cape and in the colonies, set a high value on the dried blood of the rhinoceros, to which they ascribe great virtues. . . . The animal had lost a great deal by his wounds. It was with much regret that they saw the earth moistened with it around him, and they were apprehensive that a new wound would increase that loss.

“ Scarcely had the animal breathed his last, when both old and new Hottentots all approached with eagerness in order to collect the blood. With that view they cut open its belly, and took out the bladder, which they emptied. One of them then applied the mouth of it to one of the wounds, while the rest shook a leg of the animal to make the blood flow more readily. In a little time, to their great joy, the bladder was filled, and I am persuaded that with what was lost they might have filled twenty.

“ I had approached the body also, but with a different design ; for my intention was only to measure and examine it.

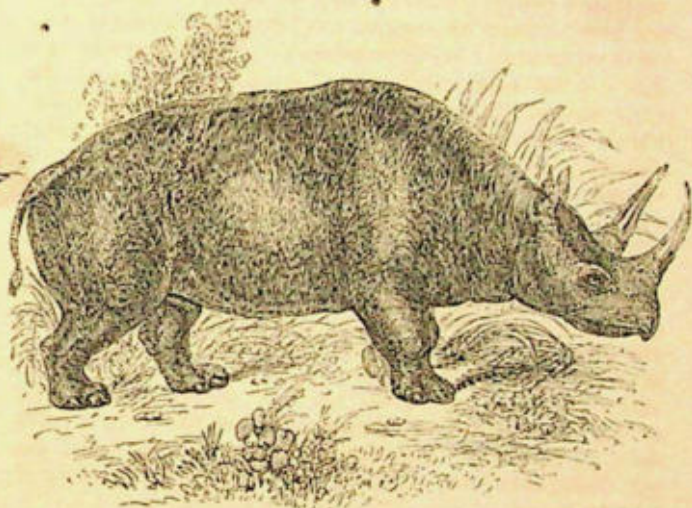
“ The savages of the horde, accustomed to see such animals very often, assured me that it was one of the largest of its species.

“ I however did not believe them, and what induced me to doubt their information was, that its principal horn was only (in French measure) nineteen inches three lines in length, and I had seen horns much longer,

in the possession of some of the Dutch planters. The height of the animal was seven feet five inches; and its length, from the snout to the root of the tail, eleven feet six inches."

#### THE KEITLOA (*Rh. Keitloa*, Smith).

In general figure this savage species resembles most nearly the common African rhinoceros. (Fig. 13.) There are, however, Dr. Smith observes, many marked



13. -Rhinoceros Keitloa.

differences between them, of which the following are a few of the external and more palpable. In *Rhinoceros Keitloa* the two horns are of equal or nearly equal length; in *Rhinoceros Africanus* the posterior in neither sex is ever much beyond a third of the length of the anterior horn; the length of the head in proportion to the depth is very different in the two. The neck of *Rhinoceros Keitloa* is much longer than that of the other, and

the position and character of the cuticular furrows destined to facilitate the lateral motions of the head are very different. Besides these, Dr. Smith states that many other diagnostic characters might be instanced; such as the black mark on the inside of the thigh of the keitloa, the distinctly produced tip of the upper lip, and the comparatively few wrinkles on the snout and parts around the eyes.

The first example of this animal which Dr. Smith met with during his expedition was shot about 180 miles N.E. of Lattokoo, but considerably south of the country to which the species appears directly to belong, and from which it might be considered as a wanderer. On the expedition penetrating to the northward of Kurrichane, every one was found conversant with the name, and able to direct to situations where the animal was found. Few mentioned the keitloa without alluding to its vindictive temper and ferocity; and those, says Dr. Smith, who had sufficient confidence in the party, compared to it a chief then awfully oppressing that part of the country, and spoke of the man and the animal as alike to be feared. As the party advanced, the keitloa became more common, though it never occurred in such numbers as the other two species.

"The interest," says Dr. Smith, "which the discovery of this species excited, led to the making of minute inquiries as to the animals of this genus; and the expedition had sufficient reason to believe, from the replies to constant questions, that two other undescribed species existed farther in the interior, one of which was described as being something like the keitloa, and having two horns—the other as differing in many respects, and having only *one* horn. The keitloa browses on shrubs and the slender branches of brushwood, using the upper lip as an organ of prehension."

#### THE WHITE OR BLUNT-NOSED RHINOCEROS

(*Rh. simus*),

Termed Mohoohoo by the Bechuanas, is larger than the two former species, being upwards of twelve feet in

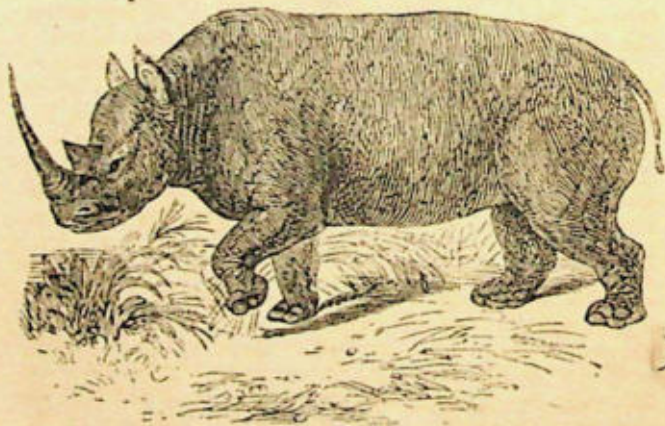


14.—White Rhinoceros.

length, and nearly six feet in height. It is a huge, massive animal, with the neck longer than in the other African species, having three deep wrinkles running from the nape down the sides; the muzzle is truncate, the mouth shaped like that of an ox, the upper lip perfectly square, and destitute of the mobility and power of protrusion which it exhibits in the other species. (Fig. 14.) Hence, instead of browsing upon shrubs, it feeds principally upon grass, and therefore frequents open plains where such herbage abounds, wandering very extensively in search of pasturage. This animal was first described by Mr. Burchell, who when at Lattakoo found it in abundance there, and Mr. Campbell brought the head of one to England. In the mohohoo the horns are situated close to the extremity of the nose: the first

is very long, tapered to a point, and slightly curved back; the second is short, conical, and obtuse. The general colour is pale broccoli-brown; the buttocks, shoulders, and under parts shaded with brownish purple; tail clothed with stiff black hair. (Fig. 15.) According to Dr. Smith, the introduction of fire-arms among the Bechuanas has rendered this animal rare in the district where Mr. Burchell found it numerous: higher up the country, however, it still maintains its ground. In disposition it differs from the other two species, being much more gentle, and is therefore regarded with less fear than either the keitloa or the borili.

The flesh of all three species is esteemed wholesome food by the natives, who dig pitfalls for them in situations to which they are known to resort; and sometimes, though rarely with success, attempt to kill them with the assagai or spear. In style of motion they are all alike, and so awkward that their swiftness is to be appreciated not by directly watching the animal itself, but by fixing the eye upon some two points between which it



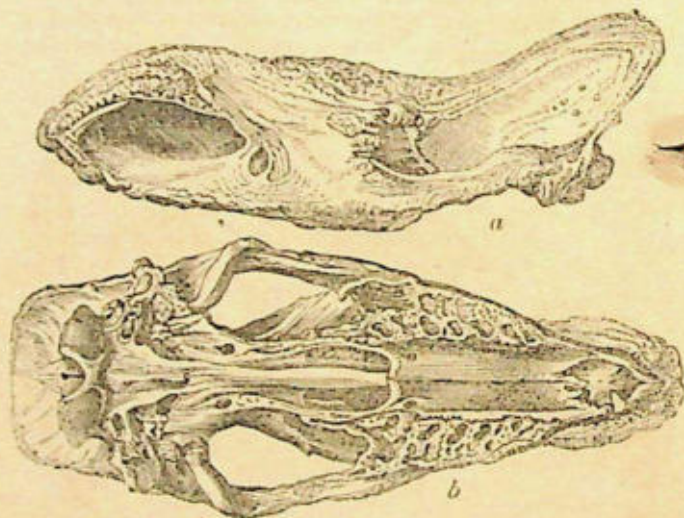
15.—Two-horned Rhinoceros.

takes its course. To revert to the one-horned rhinoceros, of which Dr. Smith heard in the interior of South Africa, and of which Bruce and Burekhardt received accounts as existing in Adel and the country south of Sennaar, it may be added that Dr. Smith adduces the testimony of Mr. Freeman respecting an animal by no means rare in Makooa, north of the Mozambique Channel, which, overlooking the absurdities and exaggeration of the description, he suspects to be a one-horned rhinoceros, and probably that of which he heard, and which may extend to the countries mentioned by Bruce and Burekhardt.

Among the fossil relics of animals which at some former period have tenanted this globe, and after a quiet possession, generation succeeding generation, of their pasture-lands, have become as it were blotted out of the book of creation, those of the rhinoceros are extremely abundant, little less so, if at all, than those of the fossil elephant or mammoth, as widely distributed, and occurring in the same strata and the same localities. Several species have been distinctly made out, among which the most remarkable is that with a bony partition between the nostrils, and supporting the nasal bones: it is termed by Cuvier *Rh. tichorhinus*. Fig. 16 represents the skull in two views: *a*, profile; *b*, seen from below.

It was of this species that Pallas in 1771 discovered an entire frozen carcase buried in the sand on the banks of the Wilouji or Viloui, which joins the Lena, in Siberia. Happily, therefore, we know the form and true proportions of the living animal. The skin was smooth and destitute of folds, and, like the common African rhinoceros, the animal had two horns. The feet had three toes, as in all extant species, but the hoofs were lost. Like the mammoth of Siberia, this animal was originally covered with hair: in many parts of the skin this hair still remained, especially over the feet, where it was very abundant, measuring from one to three inches in length, of a stiff quality, and of a dusky gray. The head was invested with a similar clothing. The head and feet are preserved in their natural state in the museum of St. Petersburg.

The skull of this species differs from that of the two-horned African rhinoceros, not only in the presence of the osseous nasal partition, but in general form and proportions. The length and narrowness of the skull are very remarkable, as is also the space between the orbits, which is much more contracted than in the common two-horned species, and the nasal bones are far more elongated. In the two-horned rhinoceros the disc which bears the anterior horn is a semi-sphere, in this an oblong ellipse, and a disc of similar figure supports the second horn, whence it may be safely concluded that the horns



16.—Skull of Fossil Rhinoceros.

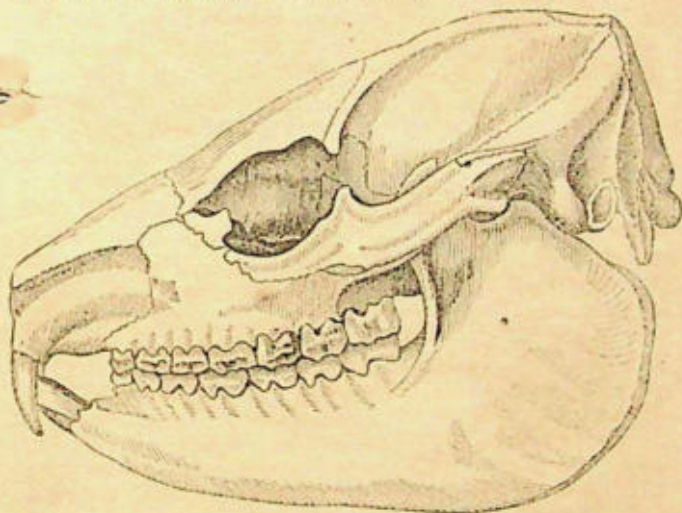
of this fossil species were strongly compressed at the sides. The occipital ridge is elevated and drawn out backwards, so that from the highest point the occipital bone slopes at a very acute angle inwards to the condyles.

About nine fossil species of rhinoceros are described.

Almost every bone-cavern in England, France, and Germany has afforded them in abundance; and Dr. Buckland proves that there must have been a long succession of years in which the elephant, hippopotamus, and rhinoceros, with the hyæna, inhabited our island; and that the former, as the bones testify, became the prey of the latter, or were devoured after natural or accidental death.

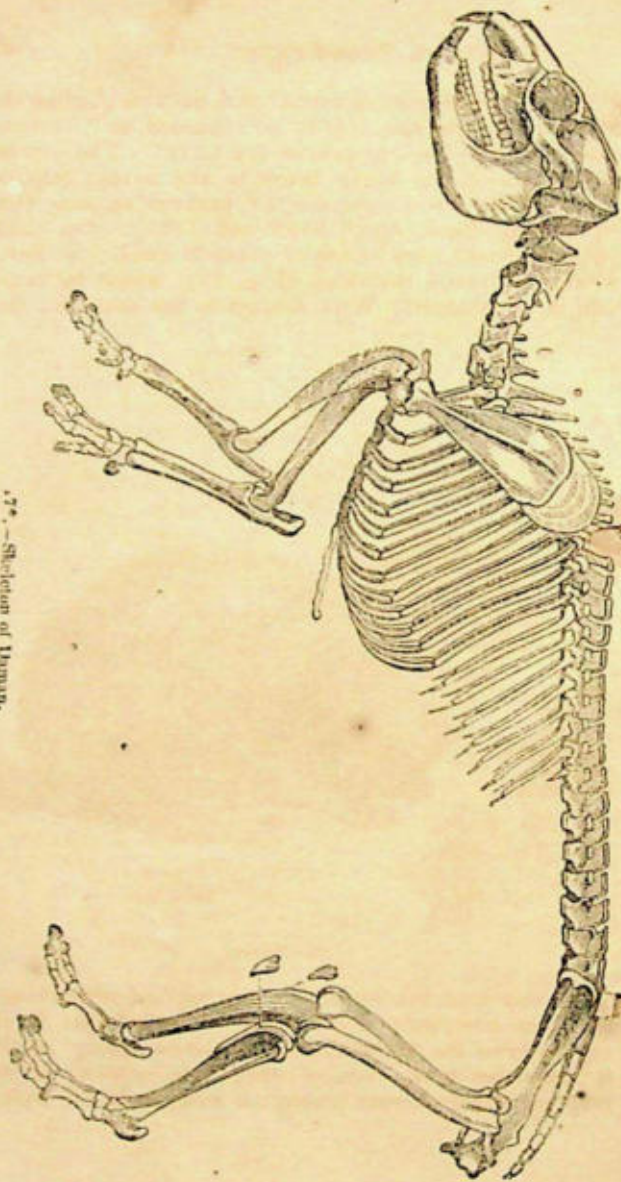
### THE DAMAN, OR HYRAX.

When we look at the rabbit-like hyrax, it does not surprise us to find that all the older naturalists regarded it as a Rodent, and placed it in that order. It was reserved



17.—Skull of Daman.

for Cuvier to point out its true situation. "There is no quadruped," says this great man, "which proves more forcibly than the daman the necessity of having recourse to anatomy, as a test by which to determine the true relationship of animals." This fur-covered active creature



174. - Skeleton of Human.

is a true pachydermatous animal, and, notwithstanding the smallness of its size, it is to be regarded as "intermediate between the rhinoceros and tapir." The resemblance which the hyrax bears to the former may be traced in its osseous system and internal anatomy (see 'Proceeds. Zool. Soc.' 1832 and 1835). On these points it would here be out of place to dwell; we have, however, figured the skull (Fig. 17), which to many will be of interest. With respect to the skull, the sin-



18.—Hyrax.

gular depth of the lower jaw cannot but strike every attentive observer; and it may be added that in the convexity of the posterior edge of the ascending portion it surpasses that even of the tapir, which, in this respect, is the nearest among all animals to the hyrax.

In other particulars the skull approaches that of the rhinoceros; the molar teeth, in fact, are those of the rhinoceros in miniature, both as to form and number. There are, as in the rhinoceros, no canines. The upper incisors, two in number, are long, triangular, pointed, stout, and separated from each other by a small interval. The lower incisors are four in number, set in close array, flat, and directed forwards. At first their edges are notched, but they become smooth by use. The molars are seven on each side, above and below: but the first, which is small, falls out, being worn down as soon as the last molar on each side has arisen; and, in old individuals, the next is frequently wanting also.

With respect to the skeleton (Fig. 17\*), it may be remarked that there are 21 ribs on each side, a number greater than in any other quadruped, except the two-toed sloth, which has 23. The elephant and tapir follow the hyrax. The fore feet are divided into four toes, tipped with hoof-like nails; the hind feet into three, of which the innermost is furnished with a long claw-like nail. The toes are all buried in the skin, as far as the little hoofs, precisely as in the rhinoceros.

Several species belong to the present genus: we have figured the Cape hyrax or daman. (Fig. 18.)

THE CAPE HYRAX, OR DASSIE OF THE COLONISTS  
(*Hyrax Capensis*),

Is common in the rocky and mountain districts of South Africa, taking up its abode in the fissures of the rugged crags, which afford it an asylum. It abounds on the sides of Table Mountain, but is so wary, quick, and active, that it is not to be approached without much difficulty. It often, however, falls a prey to the eagle and falcon, which pounce upon it while feeding in apparent security. The vulturine eagle (*Aquila vulturina*), which makes the mountain precipices its abode, destroys it in great numbers. This timid little animal is gregarious in its habits, like the rabbit, which it somewhat exceeds in size. The fur is soft and deep, and of a dark

grayish brown, becoming of a paler tint beneath. There is no tail. The following communication, by Mr. W. R. Read (see 'Proceedings of the Zoological Society,' 1835, p. 13), needs no apology for its insertion:—

"The *Hyrax Copensis* is found inhabiting the hollows and crevices of rocks, both on the summits and sides of hills, as well as near the sea-shore, even a little above high-water mark. It appears to live in families, and is remarkably shy in its wild state. In winter it is fond of coming out of its hole, and sunning itself on the lee side of a rock, and in summer of enjoying the breeze on the top; but in both instances, as well as when it feeds, a sentinel is on the look-out (generally an old male), which gives notice, usually by a shrill prolonged cry, of the approach of danger, or even the least movement of any suspicious object. It lives on the young shoots of shrubs, the tops of flowers, herbs, and grass, particularly of all those which are aromatic."

#### THE SYRIAN HYRAX (*H. Syriaeus*).

This species, according to Bruce, is found in Abyssinia, where it haunts the deep caverns and clefts in the rocks. By the natives of Amhara it is termed Ashkoko, or Askoko. It also tenants the mountains of Syria and Arabia; and, as in days of old, the rocks of Horeb and of Sinai are still "a refuge for the conies." By the Arabs, according to Dr. Shaw, it is called Daman Israël, that is, Lamb of Israel, or rather Ganam or Gannim Israel, as Bruce contends, the word Daman being mistaken for the latter. Most authorities agree that it is the Shaphan (translated cony) of the Scriptures. The Syrian hyrax agrees in habits with its Cape relative. It tenants the acclivities of the rocks, sheltering itself under projecting ledges, in deep fissures and caves; it is gregarious, and dozens may be often seen either sitting upon the great stones at the mouth of the caves, to warm themselves in the sun, or playfully skipping about in the enjoyment of the freshness of the evening. When captured, they inflict severe wounds with their

formidable incisors, but are soon rendered tame and familiar. Cuvier and many naturalists have hesitated as to the distinctness of the Syrian and the Cape hyrax. They are, as we think, undoubtedly different, and the Syrian species may be distinguished by the presence of long bristle-like, but slender, black hairs, dispersed not very thinly over its body, and considerably exceeding the fur: such at least was the case with the specimen which we examined; while in the numerous specimens from the Cape, of all ages, in the museum of the Zoological Society, nothing of the kind is to be perceived. Bruce, indeed, noticed this peculiarity, and he considered the Amharic name *Ashkoko* "as derived from the singularity of those long herinaceous hairs which, like small thorns, grow about his back, and which in Amhara are called *Ashok*."

A fossil form closely allied to the hyrax, the skull of which has been discovered in the clay near Herne Bay, has been described by Professor Owen.

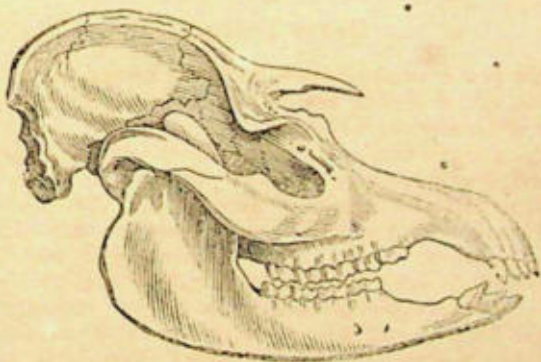
#### GENUS TAPIRUS.

This genus comprehends, as far as known, only three species, of which two are natives of South America, the other of Sumatra and Malacca.

The geographical distribution of the existing species of pachydermatous animals is so partial, that we are surprised to find the islands of Sumatra and the peninsula of Malacca dividing with South America this limited genus between them. America, compared with Asia and Africa, is deficient in living forms of the Pachydermata; two only are indigenous to that vast continent, viz. the peccary and tapir; and, reasoning from analogy, we should not expect to find either of these forms in any portion of the Old World, and more especially in the islands of the Indian Archipelago. The great mass of the Pachydermata are peculiar to the warmer regions of Asia and the continent of Africa: and many genera, as *Elephas*, *Rhinoceros*, *Sus*, and *Equus*, give species to each, but not to America: so that the existence of cog-

nate species in one of the Indian islands and in South America appears as if it were an exception to a general rule, at least if we limit our views to the races now extant on the earth. Once, indeed, America was replete with animals of this order: and why so few should now appear as their representatives is a point not easy of solution. In their general form and contour the tapirs remind us of the hog; but the snout consists of a flexible proboscis, not, indeed, elongated like that of the elephant, but still sufficiently developed to serve as a hook by which the animal is capable of drawing down twigs to the mouth, of grasping fruit or bunches of herbage. The nostrils open at its extremity in the form of two transverse fissures, but there is no finger-like appendage. (For anatomy see 'Proceeds. Zool. Soc.' 1830, p. 163.)

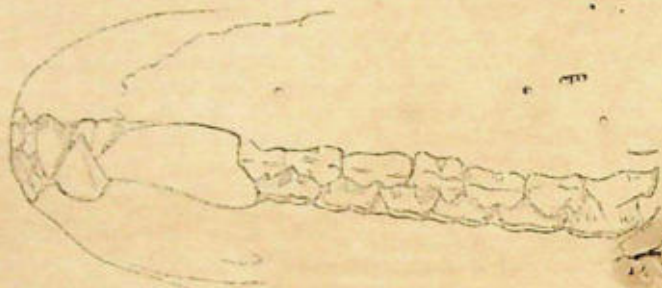
The tapir is a massive, powerful animal; the limbs are thick and moderately long; the head is large, compressed, and, in the American species, elevated at the



19.—Skull of American Tapir.

occiput (see Fig. 19), whence the thick neck rises with a prominent upper crest or ridge, along which runs a mane of stiff thinly-set hairs. The eyes are small and deep set; the ears are rather short; the tail is rudimentary.

The anterior feet are divided into four toes, the hinder into three, the tips only being cased in hoofs. The skin, which is thick, tough, and solid, is sparsely covered, excepting in one species, with very short close hair. The dentition (see Fig. 20) consists of six incisors in each jaw; the canines are small, especially those of the upper jaw, and are separated from the molars by a considerable



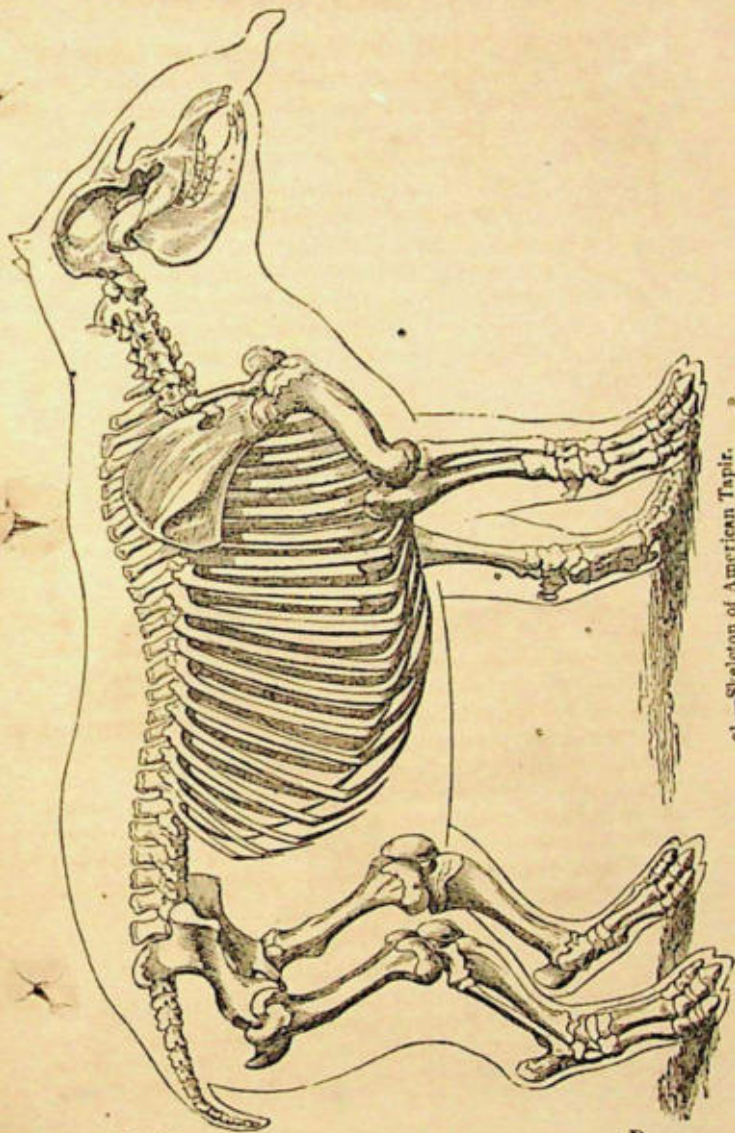
20.—Teeth of Sumatran Tapir.

interval; the molars are seven on each side above, and six below, and, until worn down by attrition, the crowns present two transverse ridges. Fig. 21 represents the skeleton of the ordinary American tapir; in general details it approaches that of the rhinoceros. Of the two species of tapir peculiar to America, one has been only recently discovered. It was found by Dr. Roulin in the most elevated regions of the Cordillera of the Andes, and is covered with long, thick, black hair. The bones of the nose are more elongated than in the other species, and Cuvier regards it as approaching in some respects to the fossil genus *Palæotherium*.

#### THE COMMON AMERICAN TAPIR

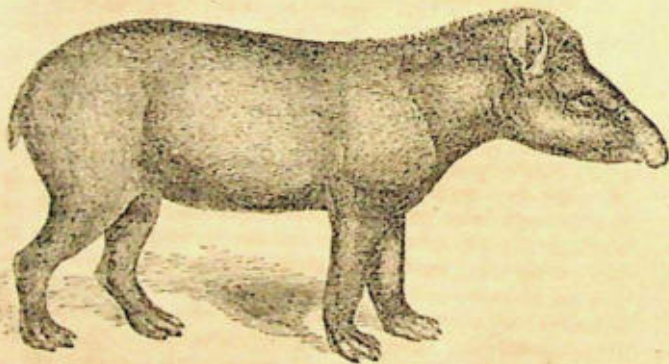
(*Tapirus Americanus*).

This species is very extensively spread throughout the warmer regions of South America, but especially between the tropics, where it inhabits the deep forests, leading a solitary life, and seldom stirring from its retreat during



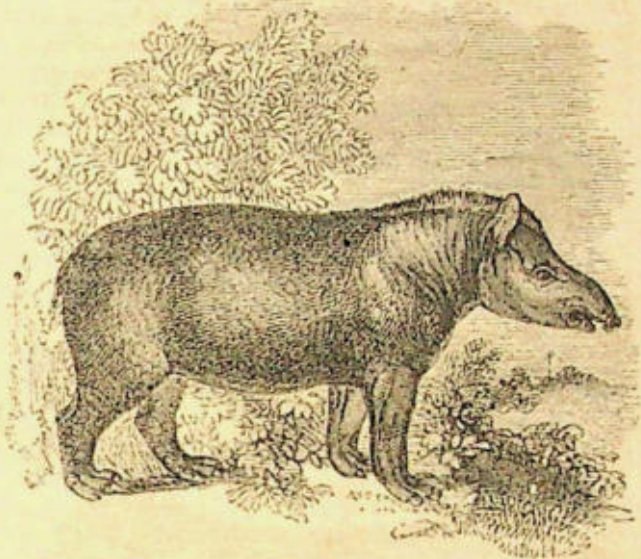
21.—Skeleton of American Tapir.

the day, which it passes in a state of tranquil slumber. During the night, its season of activity, it wanders forth in quest of food, which consists of water-melons, gourds, young shoots of brushwood, &c. Its choice of food is not very limited; and, indeed, it appears to be as omnivorous as the hog. Azara, who states that the Guaranis term this animal Mborebi, and the Portuguese of Brazil, Arta, affirms that it devours the barrero, or nitrous earth of Paraguay, and that he has found a quantity of this substance in the stomach. Its senses of smell and hearing are extremely acute, and serve to give notice of the approach of enemies. Its voice, which it seldom utters, is a shrill kind of whistle, in strange contrast with the massive bulk of the animal. Of enormous muscular power, and defended with a tough thick hide, the tapir is capable of tearing its way through the underwood in whatsoever direction it pleases: when thus driving onwards, it carries its head low, and, as it were, ploughs its course. (Figs. 22 and 22.\*)



22.—American Tapir.

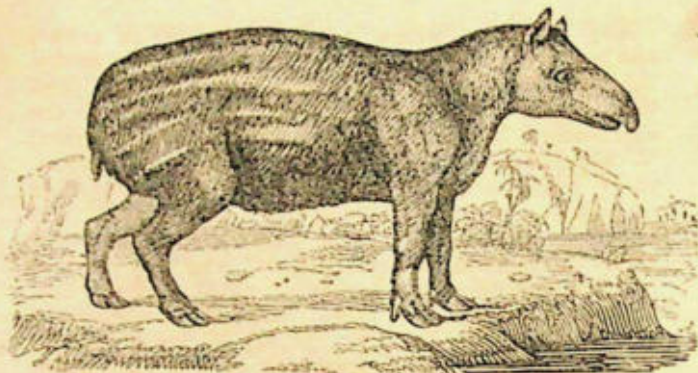
Its fondness for the water is almost as strong as that evinced by the hippopotamus. It swims and dives admirably, and will remain, as we have seen while observing the specimens in the gardens of the Zool. Soc., sub-



22\*.—American Tapir.

merged for many minutes, rise to the surface for breath, and plunge again. When hunted or wounded, it always, if possible, makes for the water, and in its nightly wanderings will traverse rivers and lakes in search of food, or for pleasure. The female is very attentive to her young one, leading it about on the land, and accustoming it at an early period to enter the water, where it plunges and plays before its parent, who seems to act as its instructress. The male takes no share in this work, and does not constantly associate with the female.

In its disposition the tapir is peaceful and quiet, and, unless hard pressed, never attempts to attack either man or beast; when, however, the hunter's dogs surround it, it defends itself very vigorously with its teeth, inflicting terrible wounds. We have witnessed those in confinement in the gardens of the Zool. Soc. occasionally break



23.—Young Tapir.

out into fits of irritation, plunging about, lunging violently with their heads, and snapping with their teeth like a hog. The most formidable enemy of this animal (if we except man) is the jaguar; and it is asserted that when that tiger of the American forest throws itself upon the tapir, the latter rushes through the most dense and tangled underwood, bruising its enemy, and endeavouring thus to dislodge him, and sometimes succeeds in the attempt.

In Cavenne\* the tapir is occasionally domesticated, and is harmless and quiet; it becomes indeed familiar, and often proves troublesome to those who caress it, as may be imagined would be the case with a pet hog under similar circumstances. The adult tapir measures from five to six feet in length, and between three and four in height; its colour is uniform deep blackish brown; the young are longitudinally marked with spots and six or eight bands of fawn-colour along the body, and with numerous spots of the same tint on the cheeks. (Fig. 23.)

#### THE MALAY OR INDIAN TAPIR

(*Tapirus Indicus*, Farquhar).

This species was first introduced to science by Major Farquhar in 1816. It is a native of Sumatra and the

Malay Peninsula, where it is called *tannoh* or *tennu*; and is as well known in Malacca as the elephant or rhinoceros. In disposition it resembles its American relative. It feeds on vegetables, and is very partial to the sugar-cane. Though the natives have not domesticated it, this species is as easily tamed as the tapir of America, and becomes as gentle and familiar. Major Farquhar possessed one which was completely domesticated, and as much at home as any of the dogs: it fed indiscriminately on all kinds of vegetables, and was very fond of attending at table to receive bread, cakes, and the like. This tapir was procured in the Malay Peninsula. (See 'Trans. Asiat. Soc.,' vol. xv., 1820.) A Sumatran tapir was about the same time presented alive to the Asiatic Society by G. J. Siddons, Esq., resident at Bencoolen. It was of a lazy habit, very familiar, and delighted in being rubbed or scratched; and this favour it solicited from the people about him, by throwing itself down on its side, and making sundry movements. It is distinctly stated of this Sumatran specimen, that another of its great delights was to bathe,—also "that it remained a very considerable time under water." The living specimen, says Sir S. Raffles, sent from Bencoolen to Bengal, "was allowed to roam occasionally in the park at Barrackpore. The man who had the charge of it informed me that it frequently entered the pond, and appeared to walk along the bottom under the water, and not make any attempt to swim." This characteristic habit of the animal was not observed by Major Farquhar in his Malacca specimen. That gentleman says, indeed, that he thought he might venture to affirm that the Malacca tapir is not, like the American species, amphibious in its nature. He adds, that the one he reared showed rather an antipathy to water, and that in the peninsula of Malacca these animals are found to frequent high grounds. As, however, it is admitted on all sides that the Malacca and the Sumatran tapirs are the same, and as these creatures differ in no material points of conformation from the American tapir, it is not easy to imagine that, while the American animal and that from Sumatra are so aquatic in their

habits, the animal from Malacca should exhibit contrary propensities. In Sumatra the tapir inhabits the dense forests of the interior, and is, therefore, seldom seen: hence it has been considered rare in that island: it must, however, be observed, that after the loss of the ship *Fame* by fire, when a living Sumatran tapir with other animals perished, Sir S. Raffles, during the short period of his stay in Sumatra, was enabled to procure other specimens, one of which is in the museum of the Zoological Society, and another in the museum of the East India Company.

The Indian tapir exceeds the American in size: it has no mane, and the snout is longer and more proboscis-like. The most striking external difference between the eastern and western animal, however, is in colour. Instead of being of the uniform dusky-bay tint of the American, the Indian tapir is strangely particoloured. The head, neck, fore limbs, and fore quarters are quite black: the body then becomes suddenly white or grayish-white, and so continues to about half way over the hind quarters, when the black again commences abruptly, and is spread over the legs. The abruptness and contrast of the marking of this animal make it look precisely as if it were covered round the body with a white horse-cloth, leaving the fore and hind quarters exposed. The young, until the age of four months, are black, beautifully marked with spots and stripes of fawn colour above, and white below.

According to Sir S. Raffles, the Indian tapir receives various names in different districts. By the people of Limun it is called *Saladang*; in the interior of Manna, *Gindol*; at Bencoolen, *Babi Ala*; and at Malacca, *Tennu*. Marsden states that it is denominated by the Malays in many districts *Kudaayer*, or river-horse. Though the flesh of the Indian tapir, like that of the American, is dry and disagreeable, and therefore of little value as an article of food, still the animal might be domesticated with advantage (and the same observation applies to the western species), and employed as a beast of draught or burden, its docility and great strength being strong recommendations. Its skin would prove, from its toughness, useful for various purposes.

## THE FAMILY SUIDÆ, OR THE HOG TRIBE.

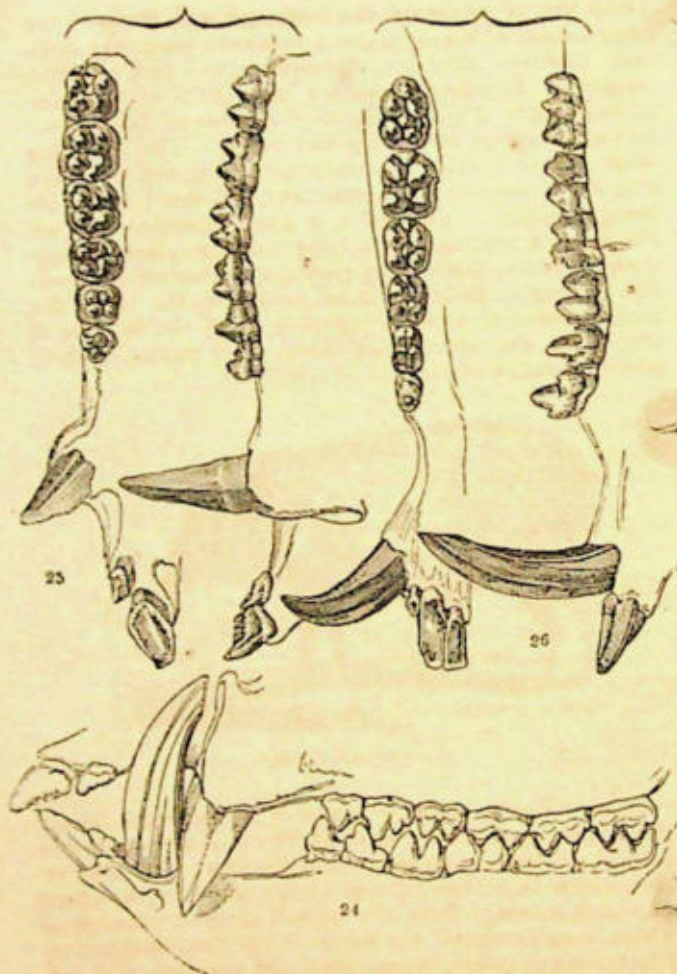
THE animals composing this family, of which the hog is the type, are distributed over Europe, Asia, Africa, and South America; it is indeed the only pachydermatous group the members of which are thus distributed. Viewed externally, the feet of these animals resemble those of the ordinary Ruminants, and may indeed be termed cloven; but the distinction is evident when we come to examine the bones. In the hog every toe (there are four on each foot) has its own metacarpal or metatarsal bone, and though the outer toe on each side is shorter than the two middle, still it is as perfect in conformation. The external similarity of the feet of the hog to those of the cloven-footed ruminants, and their real distinction, did not escape Buffon, though at the same time that celebrated philosopher was unable to discern the true affinities of this animal, and its real place in the scale of the mammalia. In the peccaries, however, it must be observed that the metacarpal bones of the two middle toes of the fore limbs and the corresponding metatarsal bones of the hind limbs are consolidated into a sort of cannon-bone, as in ruminating animals, while at the same time the stomach is divided into several distinct sacculi—an additional point of structural approximation to the ruminants.

The general external characters of the hog tribe need not be recapitulated here; all are familiar with them, as displayed by the ordinary tenant of the sty.

THE COLLARED PECCARY (*Dicotyles torquatus*).

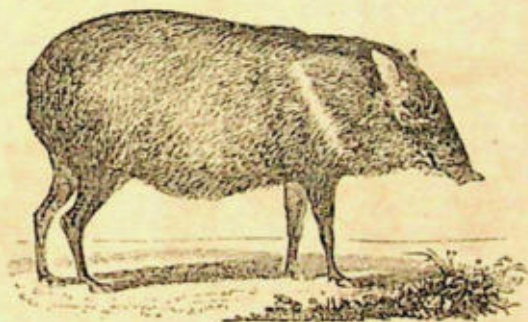
The Peccaries are the only indigenous representatives of the porcine group in America; the hog, which is now common there, being of recent introduction, though it wanders in wild herds.

The peccary closely resembles the hog in form and in the quality of the bristly hair which covers the body. It differs, however, from the hog in dentition, the incisors of the upper jaw being four instead of six, and the molars above and below on each side six; while the tusks,



24 to 25.—Teeth of Collared Peccary.

which are of moderate size compared with those of the hog, instead of taking a curve outwards, meet like ordinary canines; they are, however, sharp and effective weapons. Fig. 24 represents a lateral view of the teeth of both jaws; Fig. 25 those of the upper jaw in two views; and Fig. 26 those of the under. The limbs are more slender in proportion than in the hog, and there are only three toes on the hinder feet, the small outer toe being wanting. The tail is a mere tubercle: beneath the skin on the top of the loins is a large glandular apparatus, which pours out a secretion of disgusting odour. In their voice, their habits of rooting in the earth, the mode in which when angry they erect the bristles of the mane and clash their teeth, they resemble their porcine relative of the Old World.



27.—Collared Peccary.

The collared peccary is a native of the dense forests throughout the greater part of South America, and is usually met with in pairs or small families: they take up their abode in hollow trees and holes of the earth, where they seek a refuge from the pursuit of their enemies, of which, man excepted, the jaguar is the most destructive. Plantations of maize, sugar-canes, and potatoes often suffer from their incursions. It is only when hard pressed that the peccary defends itself: indeed it displays no-

thing of the sullen courage of the wild boar, but retreats on the appearance of danger, and precipitately seeks its hiding-place. (Fig. 27.)

Azara states that the Guaranis term this species *Tay-tétou*, and the white-lipped species *Tagnicati*. It is, he adds, domesticated with more facility than the wild hog, and becomes troublesome from its familiarity. "It is said, and I believe it, that their flesh is good, but not so fat as that of the hog; when killed, however, the glandular orifice between the haunches must be removed, since, if this be not done, the flesh acquires a bad odour and taste. Nevertheless the Indians eat it without this precaution." The inferiority of the flesh of the peccary to that of the hog, and its dorsal gland, will combine to exclude it from the European farm-yard. The collared peccary is about three feet in length, and is distinguished by a stripe of white or yellowish white passing from the withers down each shoulder and meeting on the throat. Its general colour is grizzled blackish gray; the bristles being ringed gray, straw-colour, and black.

The white-lipped peccary (*Dicotyles labiatus*) is larger than the collared species and more robust; it associates in vast troops directed by an old male; when attacked they surround the man, dog, or jaguar, and, if there be no means of escape, their enemy is soon torn to pieces. M. Schomburgk had a narrow escape from an infuriated herd, the leader of which he shot in the act of rushing at him: as the troop approached where he stood, the noise was like that of a whirlwind through the bushes; but the peculiar growl and awful clapping of the teeth," he adds, "did not leave me long in doubt as to its cause: it was evident the herd had divided, and were coming directly towards me: I know not yet how I climbed the lower part of a mora-tree, when by they rushed, their muzzles almost sweeping the ground, and their rough bristles on the back standing erect: they might have numbered fifty. They came and passed like a whirlwind; and before I had recovered from my astonishment, I heard them plunge into the river and swim to the opposite bank." Both species delight to wallow in the

mire and muddy pools, and readily take to the water, swimming with great vigour.

In captivity the white-lipped peccary has appeared to us to be more reserved and savage than the collared species, and more ready to testify by the clashing of its teeth its feelings of displeasure.

• THE BABIROUSSA

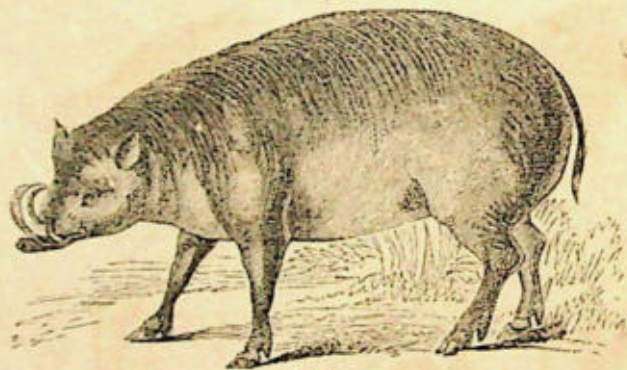
(*Sus Babirussa*, Linn. ; *Babirussa alfarus*, F. Cuv.).

The term Babiroussa means literally hog-deer, and there is some reason to think that the ancients were not altogether unacquainted with the animal. Pliny notices a wild boar with horns on the forehead, found in India; and Cosmes, a writer in the sixth century, uses the term hog-deer (*χοιρελαφος*) as the designation of an Indian animal: however this may be, it is only recently that naturalists have become well acquainted with it and its habits, though its skulls have been brought over to Europe in abundance by vessels trading among the Moluccas.

The babiroussa differs somewhat in dentition from the hog, the incisors being four above, instead of six, and the molars five on each side in either jaw. The upper canines or tusks of the male emerge directly upward from their apparently distorted sockets, and sweep with a bold arch backwards, attaining to a very great length. The skin is thick, coarse, granular, of a blackish tint, and sparingly beset with very short bristly hairs. The tusks of the lower jaw are long, strong, and sharp, emerging like those of the boar. The tusks of the upper jaw do not pass out between the lips, but cut their way through the skin, nearly half way between the end of the snout and the eyes. The tusks of the lower jaw are formidable weapons. The male when adult equals the largest hog; the female is of much inferior size, and destitute of the curled upper tusks, or has them only rudimentary.

The babiroussa is found in the marshy forests in the interior of Bourou, and other of the Molucca islands, as Amboyna, and also Java, where it associates in troops. Its habits resemble those of the wild hog, and it is rest-

less and ferocious. According to Lesson it feeds chiefly upon maize, giving preference to that grain beyond other articles of diet. It is partial to the water, and swims with the greatest ease, often crossing the straits between adjacent islands without any difficulty. Some time since a pair of these animals were living and produced young in the menagerie of Paris. They were fond of nestling under the straw, and when the male retired to rest the female would cover him over with litter, and then creep under the straw to him, so that both were concealed. The following are notes which we made from a young male babiroussa living in the gardens of the Zool. Soc. :—This animal is hog-like in its figure, and much resembles a small pig of the Chinese breed. It is roundly



28.—Babiroussa.

formed, like a young well-bred hog, and the skin lies close, giving a compactness to its appearance. The head is small, and high between the ears; the snout is elongated; the ears are very small, erect, and pointed; the eyes in their form and expression resemble those of a stag; the iris is brown; the skin, which is thinly clothed with short black bristly hairs, is everywhere dotted with small granulations, which spread and become rougher, coarser, and more decided about the limbs and

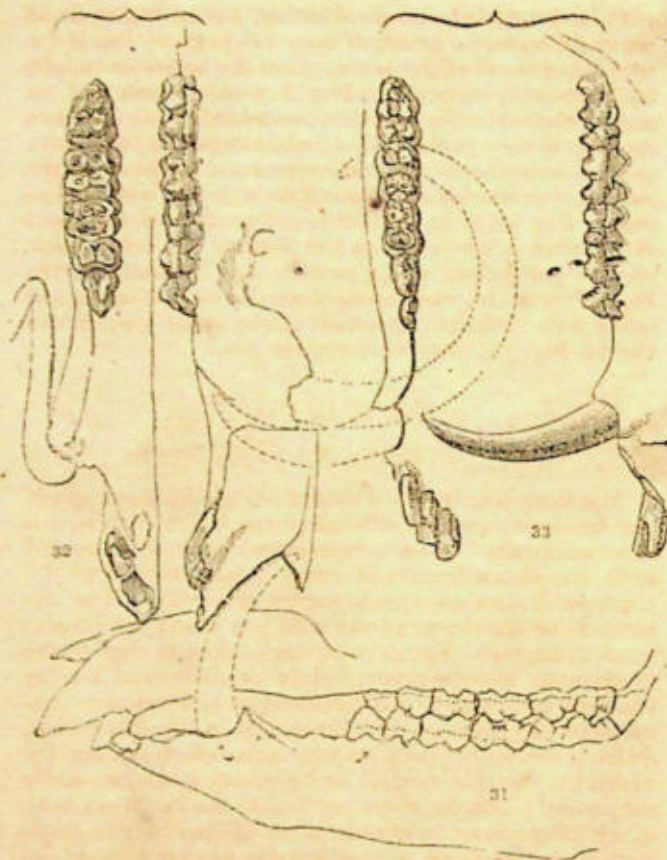
feet, and especially on the anterior part of the head and sides of the face and under jaw. (Fig. 28.) Closely as the skin lies, it becomes thrown into a series of regular and prettily arranged wrinkles or furrows with the different movements of the body, and varying in direction accordingly. As the animal turns to one side, these furrows are transverse; in other attitudes they become more or less oblique; but none are to be seen when the animal stands still or lies quietly on its straw. The tail is rather long, slender, and tapering; the limbs are well proportioned, and do not appear to be longer, in relation to the size of the body, than in the hog; the tusks of the upper jaw (in the present individual) are at present small, but curved back.



29.—Head of Babiroussa, seen in Profile.



30.—Skull of Babiroussa.



31 to 33.—Teeth of Bab rousa.

In its state of captivity this young babiroussa seems as contented as a pig in its sty, and it is not only quiet, but disposed to familiarity, raising itself up on its hind legs, and putting its snout to the bars of the enclosure, evidently soliciting food. It turns the straw over and over

with its snout, and champs in eating, but utters, as far as we could learn, no grunt, as does the hog, nor has it the unpleasant smell of the latter. That the babiroussa might be reclaimed, notwithstanding Lesson's account of its savage disposition in captivity, and added to our domestic animals, is very evident. Its flesh is reported to be held in high estimation. Fig. 29 represents the head of the male babiroussa (*a*) and of the female (*b*) by way of contrast. Fig. 30 is an admirable delineation of the skull of the adult male, in which the form of the tusks, their relative proportions and direction, are faithfully given. Fig. 31, a lateral view of the dentition of the upper and lower jaw. Fig. 32, dentition of the upper jaw, in two views; Fig. 33, those of the lower jaw.

### THE WILD HOG

(*Sus Aper*, Briss. ; *Sus Scrofa*, Linn.).

The wild hog is, as all naturalists admit, the origin of our domestic race, but at what period it was reclaimed is very uncertain. The circumstances indeed connected with the domestication of every animal subject to the bondage of man are enveloped in obscurity. The domestication, however, of the wild hog would not involve much difficulty. Young individuals taken in their native forest soon become reconciled to captivity, and display the same contentment and familiarity which are so conspicuous in the ordinary tame beast. It is this disposition, a characteristic of the Pachydermata, which renders the elephant, the rhinoceros, the tapir, and others, so easily subjugated; but, on the other hand, the readiness with which they submit to the restraints of captivity is counterbalanced by an equal readiness to assume a life of independence. The hog when left to itself resumes its original habits, as is the case in America, where wild herds roam the forest; and, as we have seen, the elephant often escapes its trammels and joins its wild brethren, immediately submitting, if retaken, to the voice of authority which it had previously learned to obey. The

horse in a wild state scours the plains of Tartary and South America; it requires but a struggle to break in the most spirited. It may be laid down as an axiom, that the animals of whose services man stands most in need are, each in its way, those whose nature most readily induces them to submit to his dominion, nay, even to court his friendship. Some we can tame, and only tame; others we can educate.

The wild hog was once common in our island, and it is almost surprising, considering the passion for the chase which seems to be part and parcel of our English temperament, that this animal is not re-established in some of its old haunts, the parks and forests of nobility. In India, indeed, the chase of the wild boar is one of the field-sports to which our countrymen are enthusiastically devoted; nor is there any reason why it might not be revived in England.

The wild hog is still common in the forests of Germany, France, and other portions of Europe, and extends also through Asia and Africa; if indeed the species is positively identical—a point which there is some reason to question. At all events slight differences are observable between the Indian wild boar and the present breed of the German forests; and Sonnini expresses a doubt as to the identity of the Egyptian and European wild race.

In no essential point does the wild race of Europe differ from our domestic breeds; the snout however is more elongated, and, as might be expected, the contour of the frame is more gaunt and bony. The ears are short and erect, the tusks large, and the bristles long and coarse; the general colour is rusty black or blackish brown, more or less brindled in patches. After the age of three years the wild boar leads a solitary life in the forest, fearless of every foe and confident in his weapons, which, added to his great strength, render him a formidable antagonist. It is not, however, until the age of five or six years that he attains to his full dimensions, and the duration of his life is from twenty-five to thirty years. The females with their young associate in herds for the sake of mutual protection: on the approach of an enemy the young are placed in the centre, the old ones



34.—Female Wild Hog and Young.

forming a circle round them; and should he be hazardous enough to venture on the attack, he meets with a rough reception. It is thus that the young are preserved from wolves, the chief foes to be dreaded by them; to which in some districts they often fall a prey, notwithstanding the vigilance of their parent. It is only in defence of their young that the females are furious, but the old males are not to be approached without caution, and often rush out upon those who venture near the precincts of their

lair. At certain seasons, indeed, the wild boar is very savage, and should he meet a rival the most sanguinary combat ensues.

In the month of December or January each male attaches himself to the society of a chosen female, whom he accompanies in the deepest glens of the forest for about thirty days. When about to produce her young, the female seeks some undisturbed retreat remote from the haunts of the male, who, it appears, exhibits a propensity to devour her progeny if he discover the litter. (Fig. 34.) To her young the female is a most attentive mother; she suckles them for three or four months, and they remain with her for a long time: an aged female is sometimes seen followed by several families, among which are some of the age of two or three years. These young rovers the French hunters call *bêtes de compagnie*. The wild boar seldom stirs from his lair during the day, and may therefore be regarded as in some degree nocturnal; on the approach of twilight, he rouses from his indolent slumbers, and sets out in quest of food, which consists of acorns, beech-mast, grain, different vegetables, and roots; in search of the latter, he ploughs up the ground with his snout: corn-fields in the vicinity of forests where wild hogs exist often suffer extensively from their nightly incursions. The wild boar, though not truly carnivorous, does not refuse animal matters which chance may throw in his way: he does not however ordinarily attack and kill others for the sake of their flesh, but only devours what he may meet with in his rambles. In the morning the wild boar returns to his lair in the thickest and most gloomy part of the forest, under a rock, in a cave, or under the canopy of gnarled and intertwined branches. When roused by the hunter and his dogs, the old boar retreats sullenly and slowly, gnashing his teeth, foaming with anger, and often stopping to receive his pursuers, on whom he often rushes with sudden impetuosity, striking with his tusks, goring dogs and men, and scattering terror around. When the boar turns upon a pack, the foremost dogs are sure to suffer, and several will fall by as many strokes. (Fig. 35.) An



23. — Boar-hunt.

instance is on record in which a boar turned suddenly upon a pack of fifty dogs which pursued him, and instantly despatched six or seven of them, wounding all the rest, with the exception of ten. The young boar is less resolute than the old animal, and will run to a considerable distance before he is brought to bay; nor is the assault attended with any great degree of danger. In all ages the chase of the boar has been a favourite diversion; the classic writings abound with allusions to it and to the risk incurred. Ovid (Fab. iv., lib. viii.) gives a spirited account of the chase, in which the fury and strength of the enraged beast are admirably depicted. It would seem that the ancients endeavoured to enclose the boar by nets so as prevent his escaping into the recesses of the forest: the combat was close and therefore dangerous; driven from his lair by the dogs, and hemmed in, the infuriated animal turned savagely upon his assailants, and died, after killing and wounding dogs and men, transfixed by spears and javelins. Our forefathers in the Middle Ages deemed the wild boar one of the noble "beastes of venery," and kept a powerful breed of hounds for the chase: the weapons used by the hunters were spears, and a sort of short sword, or *couteau de chasse*; the spears were used when the boar was brought to bay, and the attack gave abundant opportunities to the hunters of showing their skill and courage. The loud blast of the horn, mingled with the shouts of men and the baying of the hounds, proclaimed the vigorous home-thrust that struck the savage lifeless to the ground. Figs. 35 and 36 are illustrative of the boar-hunt as conducted in Europe in the Middle Ages. Fig. 37 illustrates boar-hunting as practised in India at the present day. The hunters are always mounted on horseback, and, instead of meeting the animal with spears, attack him with javelins, which are launched at him as he flies, or as he rushes to the charge, which is often so determined that the horses cannot be brought to stand the shock, or, if they do, are thrown down and gored; serious accidents sometimes occur. Mr. Johnson relates an instance in which a large and resolute boar, after



26.—Bear-hunt.

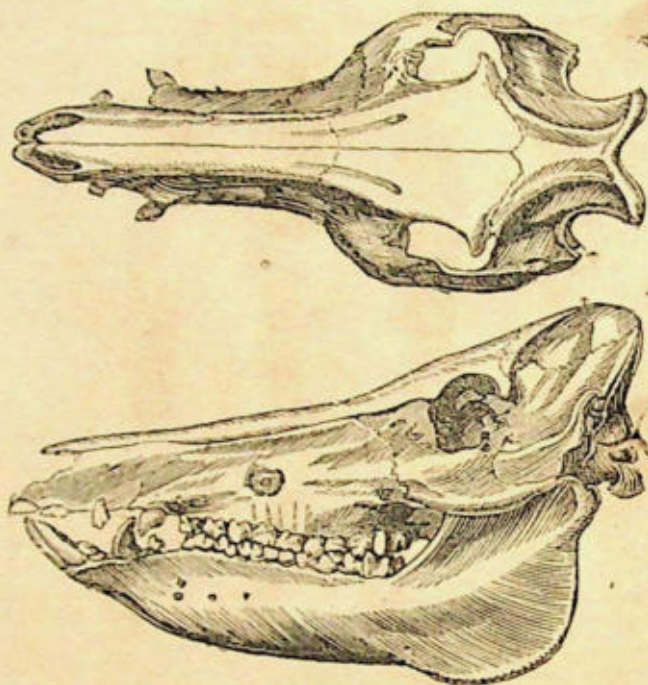
being driven by the hunters into a plain, stood at bay and challenged the whole party: he charged every horse that advanced within fifty yards of him, with great ferocity, causing them to rear and plunge, and throw off their riders, whose lives were in jeopardy: though many of the horses were accustomed to the sport, none would stand his charges, or bring the rider within javelin distance, and at last he fairly drove the party from the field; and then, gnashing his tusks and foaming, he made his way to the jungle, where it was useless to attempt to follow him.

In our own country the boar, reserved for the sport of the privileged classes, was protected by severe laws. By one of the edicts of William the Conqueror (A.D. 1087), it was ordained that any who were found guilty of killing a stag, roebuck, or wild boar were to have their eyes put out: sometimes, indeed, the penalty appears to have been a painful death.

At what precise period the wild boar became extinct in our island cannot be exactly determined; it is evident, however, that as population increased, and the vast woods which spread over many parts of the country were cut down and the land cleared, the range of the boar would become more and more limited, and its numbers decreased, till at length its extirpation would be complete. We look in vain for the forest which, in the 12th century, covered the country to the north of London, and of which Fitzstephen, in the reign of Henry II., writes, observing that "on the north are corn-fields and delightful meadows, intermixed with pleasant streams, on which stands many a mill, whose clack is so grateful to the ear; beyond them an immense forest extends itself, beautified with woods and groves, and full of the lairs and coverts of beast and game, stags, bucks, boars, and wild bulls." Banished, however, as the wild boar is from among our native mammalia, "its name is immortalised," as Mr. Bell observes, "by having given origin to the appellation of many places in different parts of the country, and by its introduction into the armorial bearings of many distinguished families of every division of the kingdom."

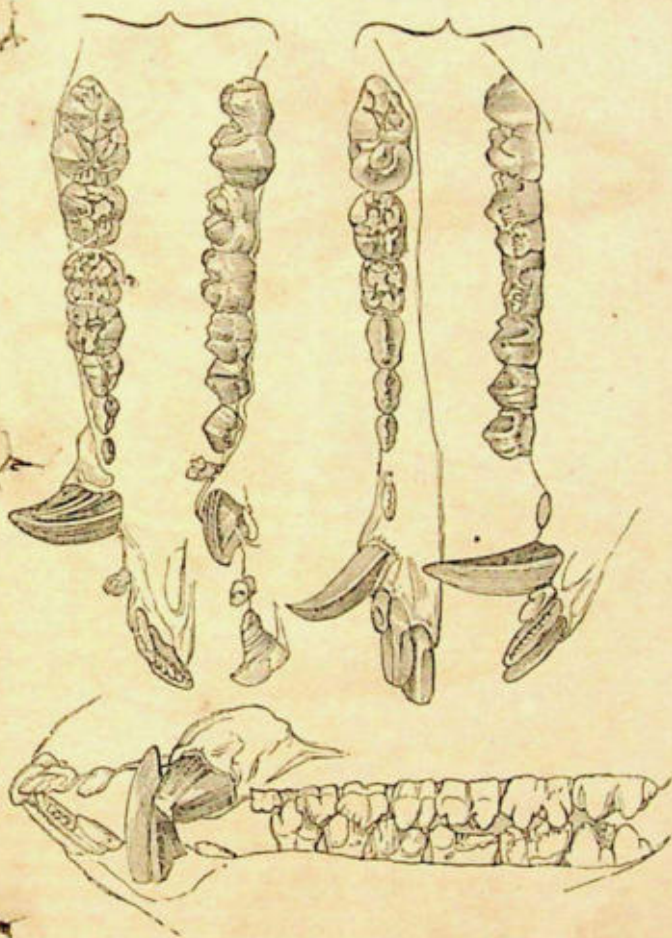


37.—Boar-hunting in India.



38.—Skull of the Hog.

The skull of the hog (Fig. 38,) which affords an index of the habits of the animal, is of a conical or wedge-like form; the base or occipital portion forms a right angle with the oblique upper surface, and a bold transverse ridge is formed by the union of the occipital and parietal bones. The nasal bones are prolonged nearly to the end of the snout, which, in the living animal, terminated in a moveable cartilaginous disc, pierced by the nostrils. The lower jaw is of great strength. The dentition (Fig. 39) is as follows:—Incisors,  $\frac{6}{6}$ ; canines,  $\frac{1-1}{1-1}$ ;



39.--Teeth of the Hog.

molars,  $\frac{7-7}{7-7} = 44$ . The canines of the upper jaw are

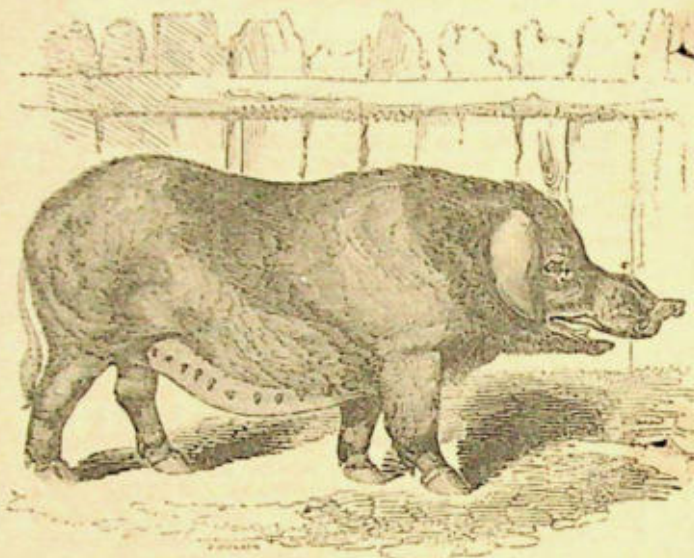
prismatic, and curve downwards, having their anterior surface worn by the action of the huge canines of the lower jaw, which are sharp, sweep out from the sides of the mouth, and often attain to the length of eight or ten inches, and sometimes even more. These canines or tusks are terrible weapons: rushing on his antagonist, the boar strikes obliquely upwards, right and left, with prodigious violence; a mode of action the best calculated for bringing these weapons into effective play, and in which the muscular powers of the neck and shoulders are the most advantageously and naturally exerted.

### THE DOMESTIC HOG

is too well known to need any description; and its utility too well appreciated to require comment. It is not, however, valued alike in all countries, and in some is regarded with abhorrence. In India both Brahmin and Mussulman reject its flesh as food, yet in many districts of that country semi-domesticated hogs wander about the villages, feeding on the refuse which they pick up in the streets. Colonel Sykes states that in Dukhun "every village abounds with hogs, but any property in them is equally abjured by individuals and the community." Detestation of the hog was a feeling entertained by certain nations in remote antiquity. It was classed by the Jews among the vilest animals, and in Egypt the swineherd was numbered among the profane, and forbidden to enter the temples of their gods; even the lowest dregs of the people refused to bestow their daughter on him in marriage. The Egyptians sacrificed the hog to Bacchus, and to the moon when full. "In the evening of the festival of Bacchus," says Herodotus, "though every one be obliged to kill a hog before the door of his house, yet he immediately restores the carcass to the swineherd that sold him." The ancient Scythians, according to the same authority, made no use of swine, nor suffered any to be

kept in the country. The Abyssinians and the Copts of Egypt, as well as the Mohammedans, reject the flesh of the hog. Among the ancient Greeks and Romans, though the office of swineherd appears to have been held in contempt, the flesh of the hog was in high estimation, and a sucking pig was as favourite a dish as amongst ourselves in the present day. The Chinese have derived no prejudices against the hog from the Mohammedan nations of the East: on the contrary, they rear these animals in great numbers for the sake of their flesh; and even the numerous population who tenant the floating town of rafts or barges contrive to keep and rear them.

“One of the most singular circumstances,” says Mr. Wilson, “in the domestic history of this animal, is the immense extent of its distribution, more especially in far-removed and insulated spots inhabited by semi-barbarians, where the wild species is entirely unknown. For example, the South Sea Islanders, on their discovery by Europeans, were found to be well stocked with a small black-legged hog; and the traditional belief of the people in regard to the original introduction of these animals showed that they were supposed to be as anciently descended as themselves. Yet the latter had no knowledge of the wild boar or any other animal of the hog kind from which the domestic breed might be supposed to be derived.” (*Quarterly Journal of Agriculture.*) Among our Saxon forefathers the hog was of great importance: its flesh was a staple article of consumption in every household, and a great portion of the wealth of the farmers and landed proprietors consisted of droves of swine, which were attended by swineherds, thralls, or bondslaves, and which were driven into the woods of oak and beech, in order to feed on acorns and mast, and all the while guarded from the attacks of the wolf. The domestic hog of that period appears to have closely resembled, in form and colour, the wild species; and the old unimproved breed, now seldom seen, may be regarded as its modern representative. (Fig. 40.) There are now in our island several breeds of this useful animal,



49.—Domestic Hog.

of acknowledged excellence, the result of judicious crossings. The test of excellence is productibility, a readiness to become fat, small bone, and the quality of the whole animal when converted into bacon: size is of minor importance. The introduction of the small Chinese breed is one great source of improvement. The Chinese hog is short in the head, with sharp neat ears, low on the limbs, and high in the chine. It is very prolific, and fattens readily. The prevailing colours are black or half black and half white. This breed, or one closely allied to it, extends from China throughout various groups of islands in the Pacific.

The breed nearest to the Chinese in this country is the Suffolk: these are generally white; they are compactly made, and deep in the chest.

Another source of improvement is the Neapolitan hog: this is a plump animal of a black colour, without any hair, and with a singular predisposition to become fat: it is however of a tender constitution. The pure black breed of Essex, which has very little hair, is closely allied to it, and when crossed with the Neapolitan produces a most valuable stock: a cross between the Neapolitan and Berkshire breed is also in high esteem. A breed between the Berkshire, Chinese, and Neapolitan may, by careful selection, produce every quality which can be desired: great fecundity, an early acquisition of fat, and moderate size, with admirable form and proportions.

The domestic hog is by no means destitute of intelligence, and little deserves the character of a stupid filthy brute, as some are pleased to call it. As regards filthiness, everything will depend on its keeper: it is true that, like the elephant and hippopotamus, it delights to wallow in the mire; but no animal more luxuriates in clean straw, and when it is styed up in filth justice is not done to it. The hog is a "huge feeder," but so are the horse and ox, and a fat hog is a more comely-looking beast than one that is lean and ill-fed. With respect to intelligence, we rank it far before the ox and horse, though it is less docile. In Minorca it is used to draw the plough, and works well; and Pennant says that in the district of Murray, between the Spey and Elgin, it was formerly employed for the same purpose, and that a credible eye-witness informed him "that he had seen in his parish there, a cow, a sow, and two young horses yoked together and drawing a plough in light sandy soil, and that the sow was the best drawer of the four." The senses of taste, smell, and hearing are possessed in great perfection by the hog: it is a saying among a certain class of persons that pigs can smell the wind; they are certainly aware of the approach of a storm, and we have seen them agitated during its continuance, screaming, and running about with straw in their mouths, or carrying it to their sty as if to add to their shelter. In Italy advantage is said to be taken of the sense of smell with which this animal is endowed in searching for truffles

and in our own country the famous sow Slut was broke in to the gun, and stood to her game as stanch as the best pointer.

The genus *Sus* as at present constituted contains, besides the common wild hog and its domestic relatives, two other species known to naturalists: of these one is the Papuan hog, or Bène of the natives of New Guinea (*Sus Papuensis*), figured and described in the 'Zoologie de la Coquille,' by MM. Lesson and Garnot. It is remarkable for its small size, and its light and agreeable proportions, and the shortness of the tusks. It is common in the forests of New Guinea, where it is esteemed by the native Papuans as delicate food: they contrive to catch these animals when young, and rear them in a state of domestication.

The other animal is the Woodswine of South and Eastern Africa, and of Madagascar, the Bosch-Vark of the Dutch colonists of the Cape (*Sus larvatus*, Cuv.). This savage and formidable animal resembles the wild boar of Europe, but its head is larger in proportion, its snout broader, and an elevated callous protuberance is seated on the cheeks between the tusks and eyes, giving a revolting aspect to the physiognomy. Prompt and vicious, the Bosch-Vark is much to be dreaded in combat, its strength and the size of its tusks rendering it a match for almost any foe. It dwells in excavations in the ground, where it is dangerous to attack it, as it rushes out suddenly from its retreat and deals rapid destruction among its assailants. Dr. Smith observes that this species is subject to great variety of colouring, scarcely any two specimens being precisely alike: some are of a brownish black variegated with white, and others are of an almost uniform light reddish brown or rufous without white markings; and it is scarcely possible to say which is the most prevailing style of colouring. The bristles are long, particularly upon the upper parts of the neck and back; the canines are of huge size and strength: the ears are short, and thinly covered both without and within with coarse black hair, which is longest at their tips. The tail is thinly covered with black bristles. Average

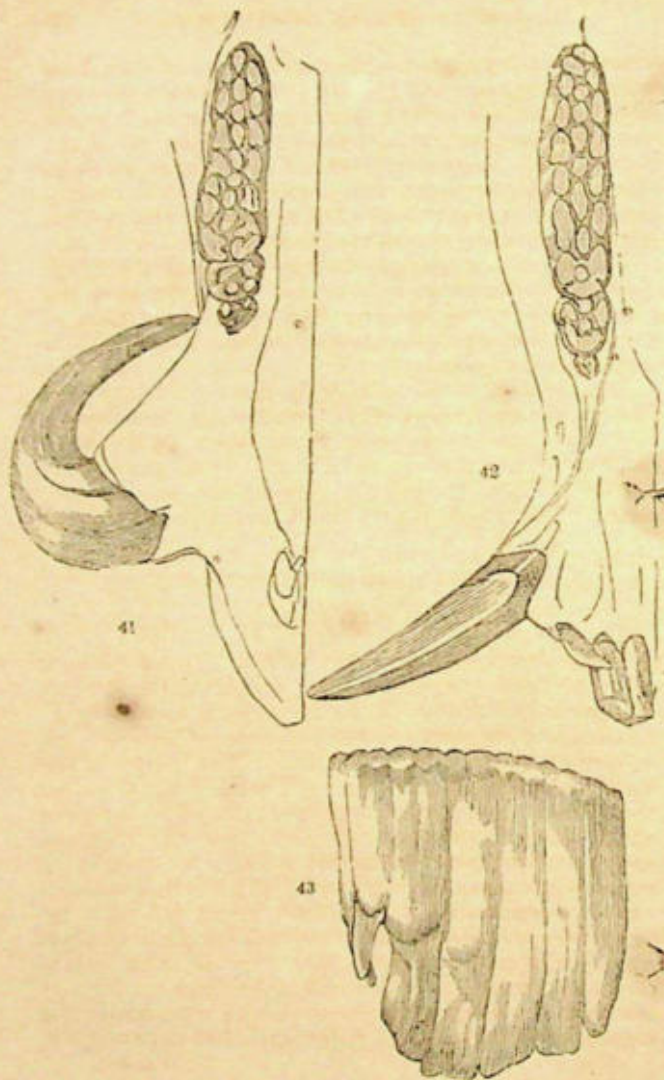
length of body, between four and five feet; of the tail, one foot.

The discovery of the bones of an extinct hog of huge size in the cavern of Sundwick in Westphalia is due to M. Goldfuss. Bones of three distinct species occur in the Epplesheim sand (Miocene division of tertiary deposits, Lyell), and fossil relics of a species have been found in Hutton Cave, in Mendip, and in other places.

Several species of an extinct genus (*Chæropotamus*) closely allied to the hog have been discovered in the gypsum of Montmartre, in certain strata in Switzerland, and in the Eocene formation of the Isle of Wight, &c.

#### GENUS PHACOCHERUS.

The animals contained in this genus resemble the pig in manners, form, and aspect, so that, were it not for the peculiarity of their dentition, they would necessarily be included in the genus *Sus*. Their dentition, however, is so different from that of the hog as to justify their separation. Instead of presenting the ordinary structure, the grinders have a great analogy with those of the elephant: they are composed of vertical cylinders of enamel enclosing an osseous deposit, and are cemented together by cortical substance, or crusta petrosa. It is long before the root of these teeth is perfected, and they advance in rotation from behind forwards, pushing before them the first molars, which in old individuals are found to be either greatly reduced or to have entirely disappeared. It is not till after ceasing to push forward that the roots become consolidated. With regard to number, they appear to vary. In the skull of the Abyssinian Phacochoere (*Ph. Eliani*, Rüpp.), which we have carefully examined, the molars were found to be four on each side above, and three below. From the first molar above, which was very small, to the third, the increase in size was gradual, but the fourth molar was long and narrowed gradually as it proceeded backwards. Had the animal lived much longer, it is probable that the first molar



41 to 43.—Teeth of Phocachære.

would have disappeared: the dentition would then have been as represented in Fig. 41. The incisors were two above and six below. The tusks were enormous. It would seem that the presence of incisors is variable; for in the South African species they either do not exist or are undeveloped. Cuvier states that vestiges of them are sometimes found under the gum; but in specimens from Cape Verde the incisors are generally complete.

Fig. 41 is one side of the upper jaw of the South African Phacochære: Fig. 42, one side of the lower jaw of the Cape Verde species: Fig. 43, a lateral view of the last molar tooth, which may be compared with the molar of the elephant.

The head of these animals is enormously large and heavy; the eyes are small and set high on the forehead, which is depressed between them; under each eye is a large coarse fleshy lobe; and a warty excrescence appears on each side of the muzzle, between the eye and the tusks. The muzzle is very broad, and the ears are erect.

### THE SOUTH AFRICAN PHACOCHÆRE

(*Phacocharus Æthiopicus*, F. Cuvier),

or Vlacke Vark of the Cape colonists. The phacochære found in Guinea, at Cape Verde, and along the Senegal, is regarded as distinct from the present species by F. Cuvier, in consequence of the possession of incisors; and is termed by him *Ph. Africanus*. The range of the South African phacochære, or Vlacke Vark, does not appear to be precisely determined; formerly it existed within the limits of the Cape colony, and still lingers on the frontier districts, but is much more common in the remoter latitudes. In the frontier districts these animals seldom venture to seek their food during the day: but in the countries inhabited by natives who are destitute of the efficient arms of the colonists they are at all times to be met, though their favourite feeding-times are early in the morning, late in the evening, and even during the night, if it be moonlight. When disturbed in its retreats,

and especially when hunted, the Vlacke Vark is a very dangerous animal ; for though it will not turn out of its way to give chase, yet, if brought to bay, or forced to extremity, it attacks with furious impetuosity, and strikes with its tusks, which are dreadful weapons : it has been known to cut with one stroke completely through the fleshy part of a man's thigh. We learn that, though this animal is used as food by the colonists, the Hottentots, and Bechuanas, it is rejected by the Coast Caffres, who are much more particular as to what they eat than any other natives of South Africa, and consider as an inferior class the persons who consume as food the articles which they hold as prohibited. The top of the head, the upper part of the neck, and the anterior part of the back are covered with very long and rigid bristles of a black-



44.—African Boar.

brown colour, those on the top of the head diverging like the rays of a circle. On the other parts the hair is shorter and of a dull brown, slightly inclined to white on the belly and flanks. The tail, except along the top, where it is furnished with a number of blackish brown bristles, is nearly naked. Length of head and body, about five feet; of the tail, about eleven inches. (Fig. 44.)

Sparrman, who was well acquainted with this species during his residence in South Africa, gives us a good account of its habits and manners, whence it would appear that the young and the females associate in herds, for, the sake of mutual defence, as is the case with the wild swine of Europe. In the tenth chapter this accurate writer says, "This day I saw for the first time a herd of *boschvarhens*, or, as they are likewise called, *wilde varhens* (wood swine or wild swine), in their wild uncultivated state; for I had hitherto seen only one of this species of animals in the menagerie at the Cape. He was confined there with a strong iron chain, and was very wild and vicious. M. Pallas informs us in his 'Spicel. Zool.,' Fasc. xi. add. p. 84, that one of them killed the keeper of the menagerie at Amsterdam. One may easily conceive that this creature is very dangerous, if one only takes notice of its large tusks. . . . In a head of this animal, salted and dried, which I gave to the Royal Academy of Sciences in Sweden, the upper tusks stand nine inches out of the jaws, and measure full five inches in circumference at the base. The two other tusks which come from the lower jaw project but three inches from the mouth, being flat on the inside, and corresponding with another plain surface similar to it in the upper tusks. These the beasts make use of not so much for biting as for goring and butting with. A little pig of this species which I afterwards caught at *Visch rivier*, and had tied up, thinking to bring it alive along with me, had already got this trick, so that I was soon obliged to let it be killed. It was terribly vicious, and quick in all its motions; and though at that time not absolutely dangerous, yet my Boshies men were very much afraid of it. 'We had rather,' said they, 'attack a lion on the

plain than an African wild boar; for this, though much smaller, comes rushing on a man as swift as an arrow, and, throwing him down, snaps his legs in two, and rips up his belly before he can get to strike it and kill it with his javelin.' . . . The dwelling-place of this same species of wild boar, to which the avenues seemed to be very narrow, is under ground. I have been told indeed that the *boschvarhens* go down into them backwards, and place themselves there in a row one behind the other; but this is not very likely, for probably these passages are widened lower down. Thus much, however, is certain, that people dare not attack them in their holes, for fear of their coming out on them on a sudden. The body of this animal is small in comparison with its head, a conformation which facilitates its burrowing and living underground.

"It would not be advisable for a man on horseback to approach too near or to hunt this animal, as it will often turn round on a sudden, and, striking with its tusks at the horse's legs, afterwards kill both him and his rider.

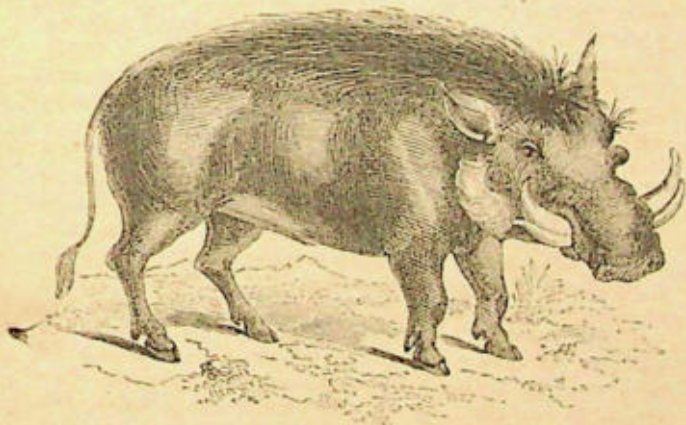
"This day I pursued several young pigs with the old sows, with a view to shoot one of them, but in vain; nevertheless the chase of them afforded me peculiar pleasure. On a sudden, the heads of the old ones, which before were of a tolerable size, seemed to have grown still larger and more shapeless than they were before; which momentary and wonderful change astonished me so much the more, as my hard riding over a country full of bushes and pits had hitherto prevented me from giving sufficient attention to the manner in which it was brought about. The secret, however, consisted in this: each of the old ones, while they were making off, took a pig in its mouth; a circumstance that also explained to me another subject of my surprise, namely, that all the pigs which I was just before chasing along with the old ones vanished all on a sudden. In this action we find a kind of unanimity among the wood-swine, in which they resemble the tame species, and which they have in a greater degree than many other animals. It is very

astonishing that the pigs should be carried about in this manner between such large tusks as those of their mothers, without being hurt or crying out in the least. I saw the same done, however, on two other occasions, as I was chasing them. The cry of their young was like that of our common pigs, as I found in some we afterwards caught."

### THE ABYSSINIAN PHACOCHÆRE

(*Ph. Æliani*, Rüppell).

This species was found by Rüppell first in Kordofan, but afterwards in greater abundance on the eastern slope of Abyssinia. It haunts low bushes and forests, and has a habit of creeping on its bent fore limbs in quest of food. In this attitude, it uses its tusks in digging up or tearing out of the ground the roots of plants, which constitute part of its diet. When thus engaged it pushes its body forwards by means of its hind legs, in order to move along. This habit of kneeling to feed has been observed in the species from Cape Verde. We have occasionally noticed it in the common hog. (Fig. 45.)



45.—Abyssinian Phacochoere.

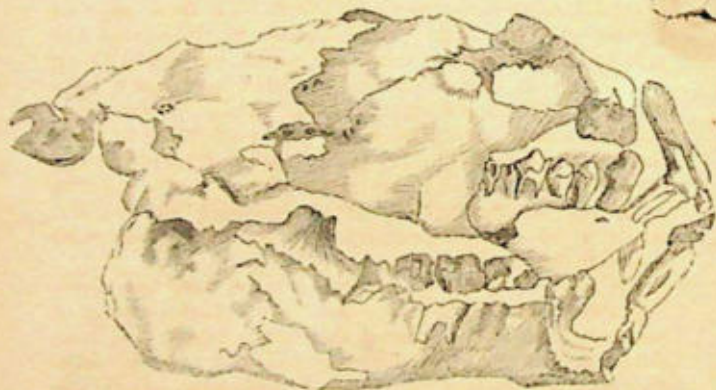
Genus *Equus*.

Of this genus we have already treated in a separate volume, and we therefore pass on to extinct fossil species of this order.

## EXTINCT FOSSIL SPECIES

## SKULL OF THE FOSSIL ADAPIS.

To the order *Pachydermata* Cuvier refers an extinct animal, of which the remains have been found in the plaster-quarries of Montmartre. The remains, however, are very rare, and we believe that only three fragments of skulls have been recovered. The adapis was evidently a small animal, its skull being only about a third larger than that of a hedgehog. There were four incisors,



46.—Skull of Fossil Adapis.

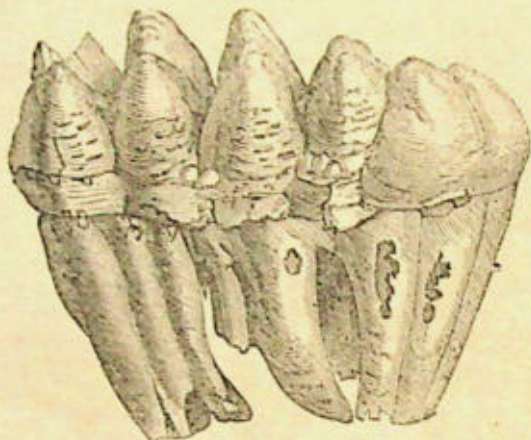
sharp-edged and oblique, in each jaw, followed by a canine tooth of a conical form and not exceeding the molars in length. Of these latter there were seven on each side, in each jaw. In the upper jaw the first molar was trenchant, the second and third surrounded

by a small ridge, the last four flat-crowned. In the lower jaw the first three molars were pointed and trenchant, the remainder flat-crowned and tuberculous, like those above opposed to them. (Fig. 46.) Of the genus, *Dichobunus* contains three species, *D. leporinum*, *murinum*, and *obliquum*: the first about the size of a hare; the other two, of a guinea-pig. They appear to have had much of the form, and probably of the habits, of the little musk-deer, or chevrotains.

### THE MASTODON.

Coexistent perhaps with the mammoth, a race of huge animals, now utterly extinct, once tenanted our globe: their remains, which are met with in the superficial strata, occur in some localities in great abundance; and, from the differences presented by the teeth and other parts, several species have been identified. To these animals Cuvier gave the title of *Mastodon*, in allusion to the principal character of the molars, which, instead of being formed, as in the elephant, of transverse laminae, have the crown of simple structure, but exhibiting ranges of bold conical elevations, divided from each other by deep furrows. (Fig. 47.) As the points of these elevations become worn down by use, the crown presents a series of lozenge-shaped lines of thick enamel (Fig. 48), but when these are quite obliterated the surface becomes uniform and concave.

Of the molars thus characterised there were two above and below on each side; but before these molars it would appear that in young individuals others had been situated, and had fallen in succession, as Cuvier satisfactorily ascertained from the examination of various specimens. With regard to the mode of succession in the grinders of the mastodon, it takes place, says Cuvier, by a movement from behind forwards. When the back tooth is in the act of piercing the gum, that anterior to it is worn and ready to fall, and they thus replace themselves one after the other. It does not appear that it is possible for more than two at a time on each side to be



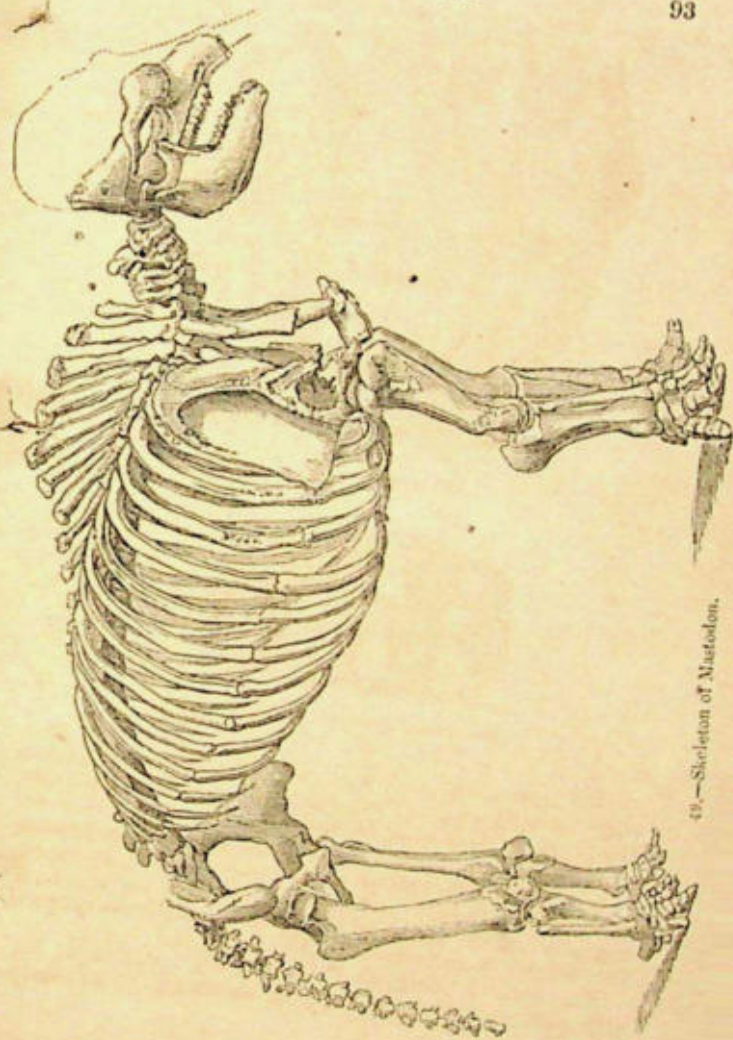
47.—Molar of Mastodon, not worn.



48.—Molar of Mastodon, much worn.

in full operation, and ultimately, as in the elephant, there is only one. That the mastodon had tusks like the elephant is proved by the large alveoli for their reception. As no perfect skull of the mastodon is known, it is impossible to define its contour: it must, however, have had a general resemblance to that of the elephant, inasmuch as the tables of the frontal bone are separated in a similar manner by extensive cells.

The neck is short, and the skeleton generally (Fig. 49) approximates to that of the elephant. The masto-



49.—Skeleton of Mastodon.

don must have possessed a proboscis, as is evident from a consideration of the structure of the skull and skeleton,—and indeed it would appear that this proboscis has not in every instance been completely decomposed. The relics of the *Mastodon giganteus*, or “animal of the Ohio,” are found in North America, especially in saline morasses, and to this circumstance Barton thinks is to be attributed the occurrence of soft parts still capable of being made out. In 1762 (as he states) out of five skeletons which were seen by the natives, one skull still possessed what they called a “long nose” with the mouth under it. Kalm, speaking of a huge skeleton, which, in accordance with the ideas of his time, he believed to be that of an elephant, and which was discovered by the savages in the country of the Illinois, says that “the form of the trunk (bec) was still apparent, though half decomposed.” Of the several species of this extinct genus the Great Mastodon, or animal of the Ohio, is the most remarkable. Its relics appear to be confined to the American continent: they are distributed very generally, and are accumulated in some places in considerable abundance, but nowhere so much so as in that saline morass popularly termed the Big-bone Lick. They are found buried in the mud, and along the borders of the morass, at the depth of four feet and upwards, together with the bones of buffaloes, stags, &c. These relics have no appearance of having been rolled, and in some places, as for example along the Great Osage River, they are found in a vertical position, as if the animals had sunk down into the mud, which had closed over them. The ferruginous matter with which the bones are impregnated, says Cuvier, is the main proof of their long repose in the earth.

The traditions which were rife among the Red Men concerning this gigantic animal and its destruction must not be passed over in silence. M. Fabri, a French officer, informed Buffon that the savages regarded these bones scattered in various parts of Canada and Louisiana as belonging to an animal which they named the Père aux Bœufs. The Shawnee Indians believed that with

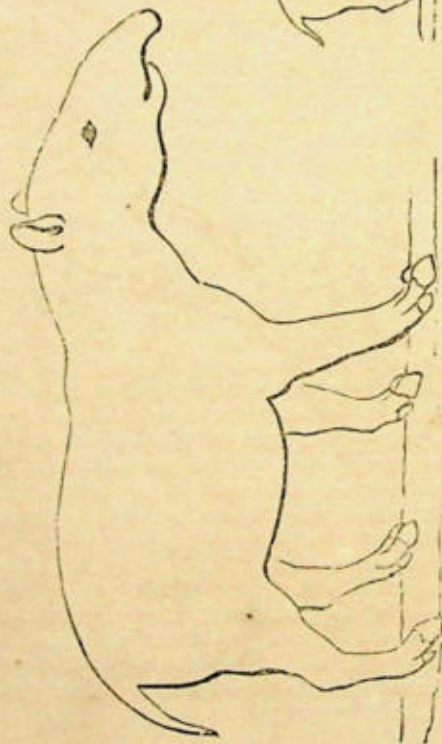
these enormous animals there existed men of proportionate development, and that the Great Being destroyed both with thunderbolts. Those of Virginia state that, as a troop of these terrible quadrupeds were destroying the deer, the bisons, and the other animals created for the use of the Indians, the Great Man slew them all with his thunder, except the Big Bull, who, nothing daunted, presented his enormous forehead to the bolts, and shook them off as they fell, till, being at last wounded in the side, he fled towards the great lakes, where he is to this day.

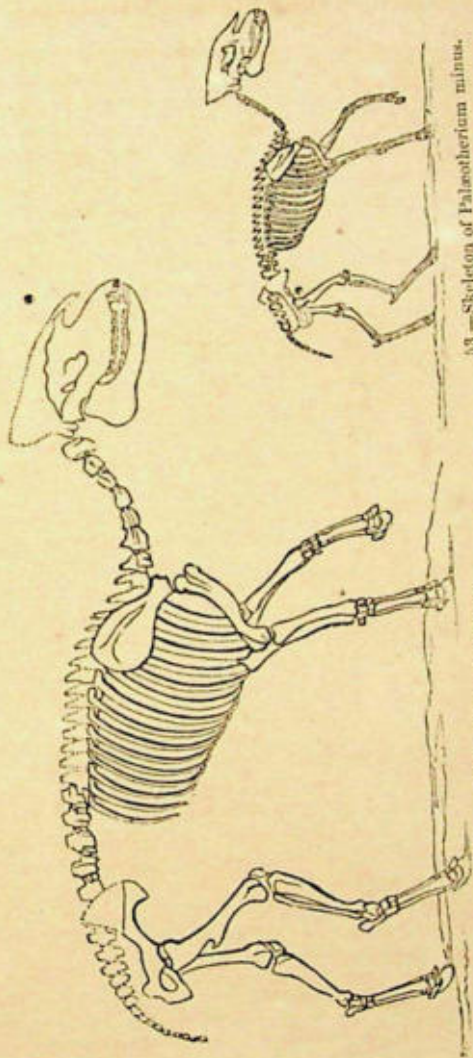
Besides the *Mastodon giganteus*, the following species are distinguished: *M. Angustidens* (Europe, America?), *M. andium* (Andes), *M. Humboldtii* (Concepcion—Chili), *M. minutus*, *M. tapiroides*, *M. Turicensis*, *M. Avernensis* (Epplesheim, Puy-de-Dôme), *M. elephantoides* (Irawaddi, Sewalik Mountains), *M. latidens* (Irawaddi, Sewalik Mountains), and *M. longirostris*, Kaup. Professor Owen has referred the teeth from the Norfolk crag to the last-named species.

#### THE PALÆOTHERIUM.

In the gypsum-quarries near Paris and in various parts of France have been discovered the fossil relics of a group of Pachydermatous animals, to which Cuvier gave the title of *Palæotherium*. Ten or eleven species are recognised, varying from the size of a rhinoceros to that of a hog. The most immediate alliance of these fossil forms is to the tapir, and they perhaps take an intermediate station between that animal and the rhinoceros. The bones of the nose prove that the Palæotheria must have been furnished with a short proboscis; the toes were three in number on each foot: the dentition consisted of 6 incisors in each jaw; canines, as usual; and 7 molars on each side above and below.

Figs. 50 and 51 represent respectively outlines of the *Palæotherium magnum* and *Palæotherium minus*, as restored by Cuvier; Figs. 52 and 53 represent the skeletons of the same animals; Fig. 54 is an imperfect skull of *Palæotherium magnum*; Fig. 55 shows the characters

50.—Outline of *Palaeotherium magnum*.51.—Outline of *Palaeotherium minus*.

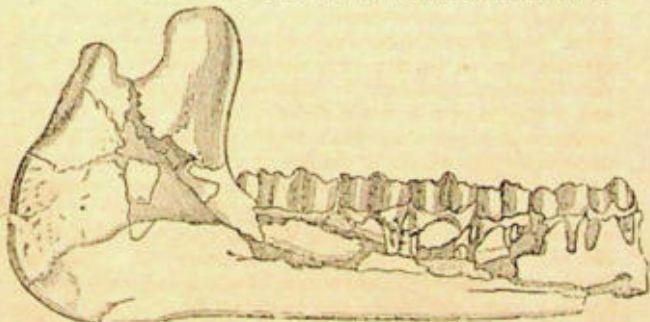
52.—Skeleton of *Palaeotherium magnum*.53.—Skeleton of *Palaeotherium minus*.

of the molar teeth of the upper jaw ; Fig. 56, the lower jaw and molar teeth, imperfect.

The restoration of the skeletons of these extinct forms is one of the triumphs of science ; and, by persons unacquainted with the law of harmonious dependence which reigns throughout the structure and organization of animal bodies, might be deemed an improbability, or at least, an uncertain process : not so—the bones of the feet, the teeth, the spine, or of the limbs, are to the comparative anatomist a foundation upon which he can rear a superstructure, a clue to the recomposition of the fabric. Speaking of the accumulated stores of fossil relics at his command, Cuvier thus writes :—“ I at length found myself, as if placed in a charnel-house, surrounded by mutilated fragments of many hundred skeletons of more than twenty kinds of animals piled confusedly around me ; the task assigned to me was to restore them all to their original position. At the voice of comparative anatomy every bone and fragment of a bone resumed its place. I cannot find words to express the pleasure I experienced in seeing, when I discovered one character, how all the consequences which I predicted from it were successively confirmed. The feet accorded with the characters announced by the teeth ; the teeth were in harmony with those indicated previously by the feet. The bones of the legs and thighs, and every connecting portion of the extremities, were seen joined together precisely as I had arranged them before my conjectures were verified by the discovery of the parts entire. Each species was, in short, reconstructed from a single unit of its component elements.” The relics of the Palæotheria are found mingled with those of many other extinct forms in a stratum of fresh-water formation, as is evidenced by the shells it contains : it is the first of the great fresh-water formations of the Eocene period of Lyell, a deposit in which nearly fifty extinct species were discovered by Cuvier. We cannot doubt but that, like the tapir and rhinoceros of the present day, the Palæotheria frequented the borders of lakes and large rivers, feeding upon the leaves and twigs of brushwood : there

54.—Skull of *Palaeotherium magnum*.

55.—Molar Teeth of Upper Jaw of the same, seen from above.

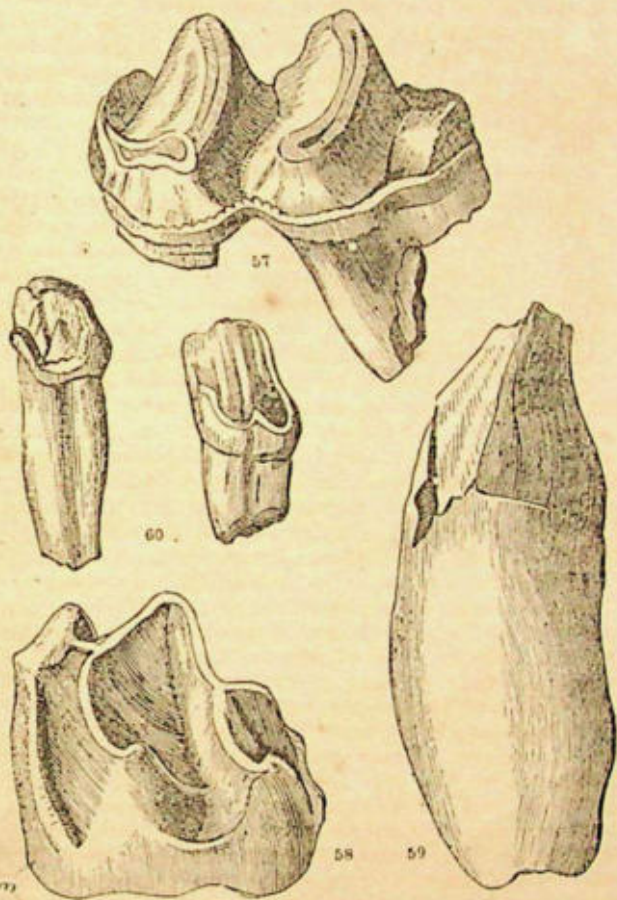


56.—External View of part of the Lower Jaw of the same.

they lived and died; their dead carcasses drifted to the bottom of the lake, swept off from the shore in seasons of flood, when the swollen rivers cleared the adjacent lowlands of hosts of dead, and perhaps also of the living, hurrying them to destruction, and depositing their relics, to be in other ages brought to light, the "reliquia veteris ævi."

#### THE LOPHIODON.

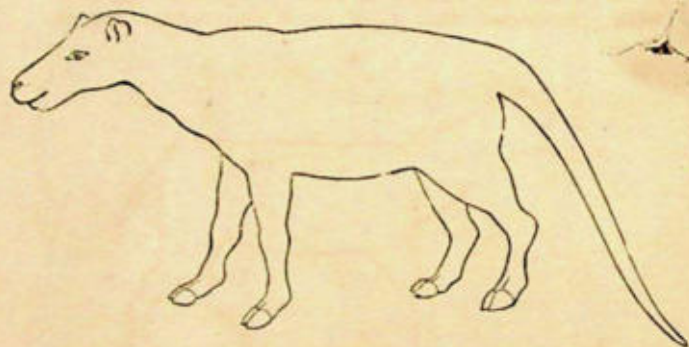
Another fossil genus allied to the tapirs is termed by Cuvier *Lophiodon*: not less than fifteen species are determined; and they are found in the same fresh-water formation as the *Palæotheria*. The dentition of the *Lophiodon* differs from that of the last-named animals, the lower jaw having only six molars. The teeth in character approach those of the rhinoceros. Fig. 57 represents a lower back molar of the gigantic *Lophiodon* of Argenton; Fig. 58, an upper back molar; Fig. 59, a canine tooth; Fig. 60, two incisor teeth: all of the same species. With many essential parts of the osteology of these extinct animals naturalists are as yet unacquainted; the bones of the nose, for example, and those of the feet, are not recovered. The remains of the *Lophiodons* found at Issel, Argenton, Bucksweiler, Montpellier, Montabusard, &c., occur in beds of fresh-water formation, but below those superficial strata containing the bones of the mammoth and mastodon. They are associated with the relics of forms of terrestrial animals of which we have no living prototypes, and with those of crocodiles and fresh-water tortoises. The antiquity of these beds may be inferred from the fact that in most places they are covered by strata of decidedly marine formation, so that the *Lophiodon* existed and passed away not only before the races had commenced whose remains are found (and found only) in the alluvial strata of the earth, but before the extinction of still older races; they belong in fact to strata of our continent over which, after becoming consolidated, the sea has rolled, and remained long enough to cover them with rocks of a new origin.



57 to 60.—Teeth of Lophiodon.

## THE ANOPLOTHERIUM.

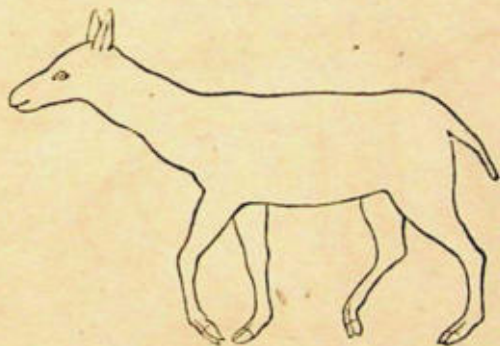
Our figures give Cuvier's restoration of the outlines of two species of the extinct group of Pachydermata termed Anoplotherium, the fossil relics of which, mixed with those of the Palæotherium, occur in the gypsum-quarries near Paris, and also, though more rarely, in the neighbourhood of Orleans and Genoa. These Anoplotheria are remarkable for the characters of their dentition; the teeth consist in each jaw of six incisors, two canines, and fourteen molars, reckoning both sides together; and these are arranged in a continued and uninterrupted series; without any vacancy between the incisors and the canines, or between the canines and the molars. The canines resemble the incisors in form, and might be



61.—Anoplotherium.

mistaken for them; the four posterior molars are like those of the rhinoceros. The feet are cloven as in the deer, being divided into two toes, sheathed with a hoof at the extremity; in the deer and other Ruminants the metacarpal and metatarsal bones are blended into a single canon-bone, but in the Anoplotherium they are separate as in the hog. Allied to the Pachydermata in some points, and in others to the Ruminantia, the Anoplotheria

appear to have occupied an intermediate station between these two great orders: their heads, judging from the skull, partook of the form of that of the horse and of the camel; the snout was not elongated into a proboscis as in the tapir or the elephant. The Anoplotheria are divided into three subgenera, on various minor details of structure. The restricted division Anoplotherium Proper comprehends two species, viz. *A. commune* (Fig. 61), about the size of the ass, and the *A. secundarium*, about the size of the hog. These animals were low on the limbs, and probably resembled the tapirs in their habits, but were furnished with a long tail compressed horizontally at the base, and rendering them more essentially aquatic: they resorted to lakes and marshes in search of aquatic plants, and, as the flattened form of the tail indicates, must have swum and dived with greater ease than either the hippopotamus or tapir.



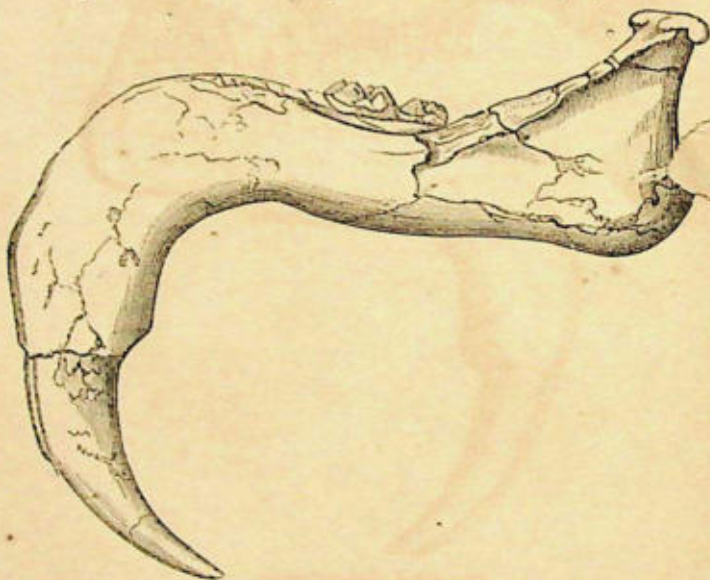
62.—Anoplotherium.

The subgenus Ziphodon contains but a single species (*A. gracile*: Fig. 62), a light, slender, graceful creature, with much of the contour of the gazelle: it was probably fleet and active, and was confined to the dry land, where it fed like the deer. The tail was short, and in this respect and in its general figure, as the

skeletons prove, it must have exhibited a complete contrast to the low-built, heavy *Anoplotherium commune*. Of the third sub-general outline of the *Adapis* we have as yet no means of arriving at any idea.

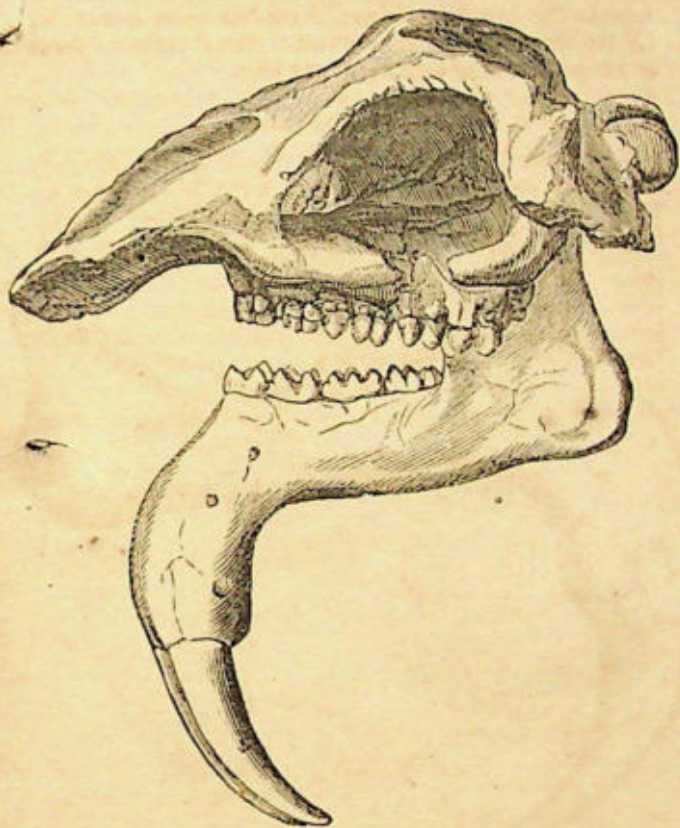
### THE DINOTHERIUM

(*D. giganteum*), as restored by Professor Kaup. Cuvier, from teeth and isolated fragments, gave, in his work on fossil bones, the title of "Tapir gigantesque" to the huge animal of which they were the relics, the only ones



63.—Lower Jaw of Dinotherium.

then discovered. It was reserved for Professor Kaup to add to our knowledge of the animal in question, by the discovery first of several lower jaws (Fig. 63), and subsequently of the skull (Fig. 64), which were found

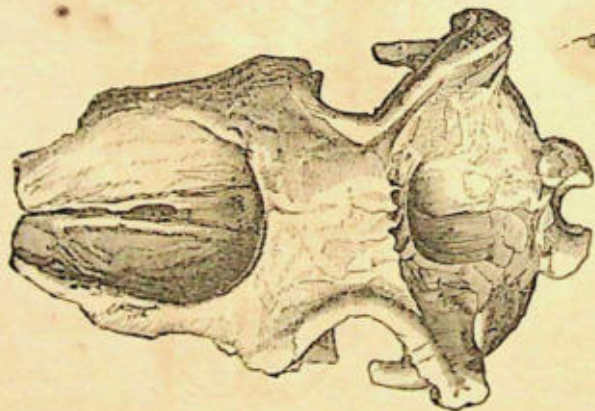


64.—Skull of Dinotherium.

bedded in a stratum of sandstone (the second or Miocene system of tertiary deposits) at Eppelsheim, about twelve miles south of Mayence, in company with relics of the following, viz.: a second species of dinotherium, making the species 2: Tapirus, 2, larger than living species; Chalicotherium (allied to tapirs), 2; Rhi-

noceros, 2; Tetracaulodon (allied to mastodon), 1; Hippotherium (allied to horse), 1; Sus, 3; Felis (some as large as a lion), 4; Machairodus (allied to bear, *Ursus cultridens*); Gulo (glutton), 1; Agnotherium (allied to dog, but as large as a lion), 1.

Cuvier, before he had completed the last edition of his 'Règne Animal,' became aware of M. Kaup's discovery of the lower jaw, and in his Additions, vol. i. p. 581, he alludes to this fragment as affording data for the separation of the "Tapir gigantesque" into a distinct genus. To this genus M. Kaup has given the title Dinotherium. The skull of this extraordinary animal is more than a yard in length, and the size and situation of the nasal orifice (Fig. 65), with the salient portion of



65.—Skull of Dinotherium.

the short nasal bones, indicate the probable possession of a proboscis; we say probable, because in the manatee or lamantin, and also the dugong, we have a similar extent and situation of the nasal orifice, a circumstance militating against the inference that a proboscis necessarily accompanies this conformation of the skull. Indeed

the general aspect of the skull of the dinotherium, setting aside the tusks of the lower jaw, and its strange alveolar projection, strongly reminds us of that of the lamantin (*Manatus*, Cuv.). The orbits themselves are very small, but the temporal fossæ are very deep and extensive, indicating the great mass of the temporal muscle. The lower jaw is most remarkable. It is armed at the extremity with two enormous tusks (incisors), which, instead of projecting upwards or forwards, sweep

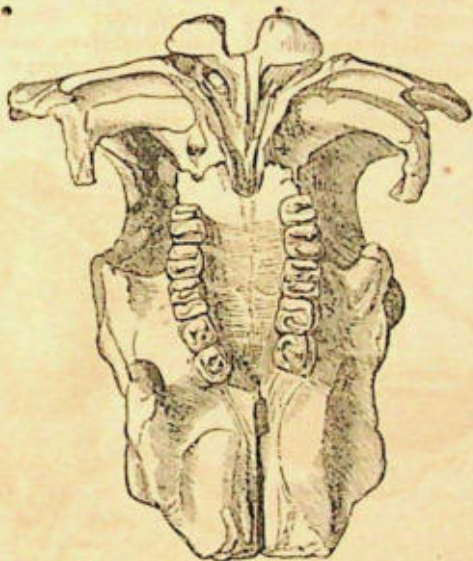


Fig. 66.

downwards, and curve gently backwards, having their roots imbedded in enormous alveoli. The dentition is as follows:—Incisors,  $\frac{0?}{2}$ ; canines,  $\frac{0-0}{0-0}$ ; molars,  $\frac{5-5}{5-5} = 22$ .

Of the molars the third has three transverse ridges across its surface, the others have two, with the exception of

the first molar of the lower jaw, which has only one at its posterior part, the anterior portion being trenchant. Fig. 66 represents the palatal view of the skull of the dinotherium; Fig. 67, the molar teeth and the relative bearing of the two rows, which approximate towards each other anteriorly.

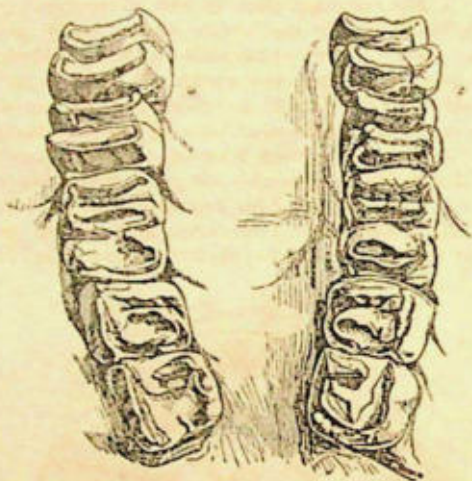


Fig. 67.

The situation and affinities of the dinotherium have been the subject of much speculation, and very opposite opinions have been entertained by different naturalists. M. Kaup, influenced by the discovery of huge claws and a scapula, resembling in character those of the Pangolins (*Manis*), assigns the animal to the Edentata, but differing from all extant species not only in exceeding the elephant in size, but in having, like the elephant, a proboscis. Dr. Buckland regards the dinotherium as approximating to the tapir, of aquatic habits, and furnished with a proboscis, by means of which it conveyed to the mouth the vegetables raked from the bottom of

lakes and rivers by its tusks and claws; and he alludes to its claw resembling that of the Pangolins. MM. Blainville and Duméril consider the dinotherium to have been allied to the lamantins, or "aquatic gravigrades,"—to have been in fact a dugong with tusk-incisors, and therefore one of the concluding forms of the Pachydermata. They consider that it had no proboscis, but a huge inflated muzzle and upper lip. Gæger places it with the seals. Now, as regards M. Kaup's theory, we may at once state that the claws and scapula on which he founds it are not proved to belong to the dinotherium; and he himself admits that, should the discovery take place of other fossil relics whence the certain existence of a *Manis gigante* might be presumed, his theory would be overthrown. Our own opinion coincides with that of M. Blainville. The occipital condyles (see the posterior view of the skull seen from below, Fig. 68, and

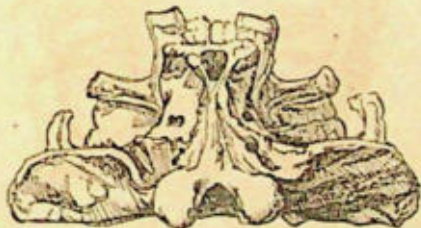


Fig. 68.

the skull Fig. 64) are terminal, or in the direction of the longitudinal axis of the skull, as in the lamantins, and also the cetaceous mammalia modified for aquatic existence. The occipital surface is large, subvertical, and even inclined from before backwards, with a profound mesial depression for the insertion either of a very strong cervical ligament or powerful muscles for the elevation of the head. The basiliary portion of the skull (Figs. 66, 67) is narrow in its component parts, while the vertical surface (Fig. 64) is, as in the lamantins and dugongs,

very wide, overplumbing the temporal fossæ, of which the depth and width indicate the enormous levator muscles of the lower jaw, not only for the purpose of mastication, but for the particular action of the lower jaw, with its rake-like tusks. Moreover, in the lower jaw we find an analogy to that of the dugong, of which the branches curve downwards for a third of their length to a deflected symphysis, only that in the dinotherium this downward curvature is carried to a far greater extreme, for the implantation of tusk-incisors. What were the limbs of this gigantic animal? If its habits were terrestrial, which a consideration of the skull forbids us to believe, the dinotherium must have had solid pillars of support, like the limbs of the elephant, and destitute of that liberty which even in the Pangolins they are endowed with; but if our ideas are correct, its limbs



69.—Dinotherium.

were adapted for aquatic locomotion, and perhaps the posterior pair were wanting, or formed the elements of a terminal paddle. Its diet was undoubtedly vegetable, as in the dugong; and we may conceive it tearing up the strong-fibred vegetables from their subaquatic bed by means of its tusks, which might serve also as weapons of offence, or as anchors for the purpose of mooring itself to the banks of the lake or river, or of dragging its unwieldy body partially out of the water. (Fig. 69.)

Dr. Buckland informs us that bones of the dino-therium have lately been found in tertiary fresh-water limestone near Orthes, at the foot of the Pyrenees, and with them remains of a new genus allied to rhinoceros, of several unknown species of deer, and of a dog or wolf equalling a lion in size.

Cuvier and Kaup calculate the length of the dino-therium at about eighteen feet; the massive lower jaw measures nearly four feet, exclusive of the tusks.

#### FOSSIL SKULL OF TOXODON (*Toxodon Platensis*, Owen).

We are inclined to refer the toxodon, of which an imperfect skull and fragments of a lower jaw, and some teeth, are our only guides, to the aquatic Pachyderms; and, as in the instance of the dino-therium, we draw our deductions from the weight of the skull, from the form and position of the nasal aperture, the slope of the occiput, and the position of the occipital condyles.

The skull in question was brought by Mr. Darwin from South America. It appears that during his sojourn in Banda Oriental he heard of some giant's bones at a farm-house on the Sarandis, a small stream entering the Rio Negro, about 120 miles north-west of Monte Video. Accordingly there he rode, and for the sum of eighteen-pence purchased the cranium now in the museum of the Royal College of Surgeons, London. Mr. Darwin was informed by the people at the farm-house that the relics were exposed in consequence of a flood having washed down part of the bank of earth. When first found the skull was perfect; but unfortunately the boys of the

neighbourhood knocked out the teeth with stones, and set up the head as a mark to throw at. Mr. Darwin, however, found a perfect tooth, and fragments ascertained by Professor Owen to be those of the lower jaw. These remains were so fresh as to render it difficult to believe that ages had passed since their interment; and Mr. Darwin observes that they contained so much animal

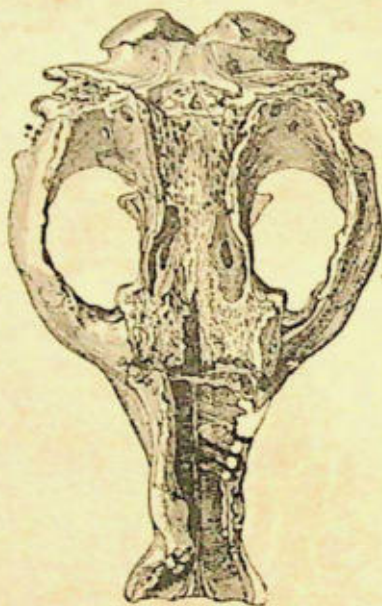


Fig. 70.

matter, that, when a portion was heated in the flame of a spirit-lamp, it not only exhaled a very strong animal odour, but burnt with a slight flame. The deposit in which they were imbedded was a whitish argillaceous earth, forming the banks of the Sarandis, overlying a granitic foundation.



Fig. 71.



Fig. 72.

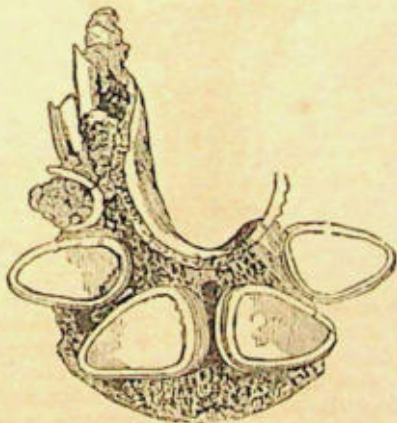


Fig. 73.

The skull in question equals in size that of the hippopotamus, measuring two feet four inches in length, and one foot four inches in extreme breadth. The form of the skull (Figs. 70, 71) is elongated and depressed; the zygomatic arches are of enormous size and strength, an index of the great volume of the temporal and masseter muscles. The occipital region (Fig. 72) slopes from the condyles upwards and forwards. The maxillary portion of the skull is compressed laterally, narrow across, and with large intermaxillary bones, slightly dilated at their extremity. The superior part of the skull was cavernous, with cells, or sinuses, giving to it greater apparent volume than the cerebral cavity would lead us to infer. According to Professor Owen the dental formula is as follows: Incisors,  $\frac{4}{6}$ ; canines none, a vacant space being in their place; molars,  $\frac{7-7}{7-7} = 38$ .



74.—Incisor of Lower Jaw of Toxodon.

The incisor teeth (see Fig. 73, the fragment of the anterior part of the lower jaw, with the teeth *in situ*; and Fig. 74, an incisor of the lower jaw) are remarkable for their resemblance in many respects to those of the Rodents; they were rootless, and had persistent pulps; growing, therefore, as worn down by use. In the upper jaw the two central incisors were very small; the two

external ones very large, curved, with their sockets extending back in an arched direction through the intermaxillary bones to the maxillary, and terminating, without becoming contracted, immediately anterior to the grinding teeth. In the lower jaw the two middle incisors are largest, the rest gradually diminishing in size. (Fig. 73.) The molar teeth also were rootless, and curved, whence the name *toxodon* (*τόξον*, a bow, *ὀδούς*, a tooth); and their grinding surface presented one or more folds of enamel re-entering the osseous substance of the centre, as in Rodents. See Fig. 77, the last molar teeth but one of upper jaw; Fig. 78, the grinding surface of the same; Fig. 79, the grinding surface of the corresponding molar of lower jaw.

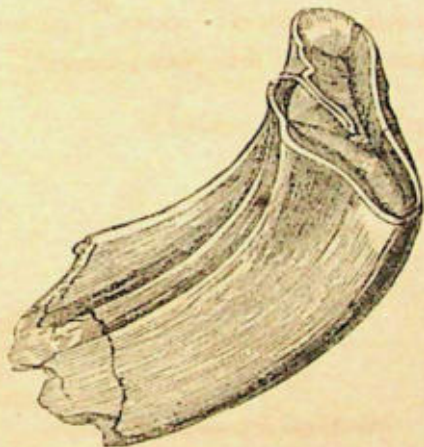


Fig. 77

We might here enter on many minutæ, and follow Professor Owen through his anatomical details, were it not that they are rather adapted for the close attention of the comparative anatomist than the general reader. Those who wish to gain the fullest information on these

points we may refer to the 'Proceeds. Geol. Soc. Lond.' 1837; and the 'Zoology of the Beagle: Fossil Mammalia.' We may observe, however, that "in the aspect of the plane of the occipital foramen and occipital region of the skull, in the form and position of the occipital condyles, in the aspect of the plane of the bony aperture of the nostrils, and in the thickness and texture of the osseous parietes of the skull," the toxodon manifests an affinity to the dinotherium and the aquatic Pachyderms (the herbivorous Cetacea of Cuvier, but which in manners and organization have little relationship to the true whales, excepting as far as they are all modified for the waters of the deep).



Fig. 78.



Fig. 79.

With respect to the limbs of the toxodon, we have as yet no evidence respecting their form or number; how far, therefore, they were constructed for aquatic progression, whether for this solely, or for occasional visits to the land, is yet a problem to be solved. Professor Owen, however, suggests that the presence of large frontal sinuses renders it not improbable that the habits of this species were not so strictly aquatic as the total absence of hinder extremities would necessitate.

In speaking of the dinotherium and toxodon it will be seen that we have referred them, with the lamantins and dugongs (more properly dayongs), to the aquatic Pachyderms, between which group and the ordinary Pachyderms we regard the hippopotamus as forming a

link, though decidedly within the pale of the latter. Cuvier has remarked that such of the Pachydermata as approach the Ruminants in the structure of their feet partake in some degree of the complication of the stomach which in the animals of the latter order is so remarkable a character; and it may be said, *per contra*, that such Pachyderms as approach in a certain degree in habits to the aquatic group resemble them in the structure of the same organ. The stomach of the semi-aquatic hippopotamus, for example, consists of certain sacculi, which renders it analogous to that of the lamantin. Sir E. Home observes that "the stomachs of the manatee and hippopotamus bear a close resemblance to each other in structure, and are in many respects similar to that of the peccary, which is a variation of the hogs, to which the tapir is also allied; and these circumstances throw small light upon the preparatory processes required for the digestion of different kinds of vegetable food.

The grass of the field is the food of ruminating animals, and, from the structure of their digestive organs, it is evident that much previous digestion is necessary for its preparation. The grass and weeds at the bottom and on the banks of rivers is the food of the manatee and hippopotamus, and the apparatus formed for preparing these substances displays an approach to the stomachs in Ruminants. In the hog tribe the resemblance is less, those animals having a more indiscriminate diet; the structure of their stomach shows that grass is by no means their natural food. The stomachs of the manatee and hippopotamus, then, which at first sight appear so extraordinary and incomprehensible, are in fact the links which unite the Ruminants to those animals which feed on roots and various vegetable substances, and form a key, without which the different gradations cannot be satisfactorily explained."

It is not only in the form of the stomach, but in the structure and contour of the skull, the position of the eyes and nostrils, and even in the nature of the skin, with its subcutaneous layer of fat, that we trace the approximation of the hippopotamus to the lamantins; and

it may be that the toxodon, and even dinotherium, form links between the lamantins and hippopotamus, being within the pale of the group to which the former belong.

We may here observe, that the number of fossil genera included within the Pachydermata greatly exceeds that of genera containing living species, of which latter many, as *Equus*, *Elephas*, *Rhinoceros*, and *Hippopotamus*, have fossil as well as living species: so that the number of fossil or extinct species already ascertained of the Pachydermatous order, taken collectively, is far greater than the number of living species. In some, perhaps many, instances the affinities of the fossil Pachyderms are not understood, fragments of bones only having been recovered: in some instances they cannot be mistaken.

We began our observation on the Pachydermata! alluding to the unfilled intervals between the forms now living on the surface of the earth, and a statement that in fossil forms—some yet to be discovered, others to be made out, and, as it were, re-constructed—would the lost links in the chain be recovered; and we again express our opinion that ultimately the work will be, if not perfectly, at least to a great extent, accomplished.

That our ideas are not unreasonable we have from time to time satisfactory proofs. Sir Thomas Mitchell has recently transmitted from Australia some fossil bones which incontestably prove the existence of at least one gigantic Pachyderm, at some remote period, in that region. These fossils consist of a portion of a molar tooth, of the shaft of a thigh bone, with part of the spine, of a scapula, and some smaller fragments of a long bone. They were found on the Darling Downs, those extensive plains marked to the south-west of Moreton Bay on most maps of Australia, at the source of the river Darling, and upwards of 4000 feet above the level of the sea. Sir Thomas Mitchell, in his letter to Professor Owen, to whom the relics were forwarded, states that these huge bones are found in some abundance. It would appear from Professor Owen's examination, that

this huge extinct animal was allied both to the mastodon and dinotherium. Fig. 80 represents the femur of this extinct Australian Pachyderm—*a*, its transverse section; Figs. 81, 82, two views of the portion of a molar tooth of the same. These fossils, now in the museum of the Royal College of Surgeons, cannot, observes Professor Owen, be contemplated without suggesting many interesting reflections.

“They tell us plainly that the time was when Australia's arid plains were trodden by the hoofs of heavy Pachyderms; but could the land then have been, as now, parched by long continued droughts, with dry river-courses, containing here and there a pond of water? All the facts and analogies which throw light on the habits of the extinct mastodons and dinotheres indicate these creatures to have been frequenters of marshes, swamps, or lakes. Other relations of land and sea than now characterize the southern hemisphere, a different condition of the surface of the land and of the meteoric influences governing the proportion and distribution of fresh-water on that surface, may therefore be conjectured to have prevailed when huge Mastodontoid Pachyderms constituted part of the quadruped population of Australia. May not the change from a humid climate to the present particularly dry one have been the cause, or chief cause, of the extinction of such Pachyderms? Was not the ancient Terra Australis, when so populated, of greater extent than the present insular continent? The mutual dependencies between large mammalian quadrupeds and other members of the animal kingdom suggest other reflections in connection with the present fossil. If the extinct species ever so abounded as to require its redundancy to be suppressed by a carnivorous enemy, then some destructive species of this kind must have co-existed, of larger dimensions than the extinct *Dasyurus lanianus*, the ancient destroyer of the now equally extinct gigantic Kangaroos, *Macropus titan*, &c., whose remains were discovered in the bone-caves of Wellington Valley. Extremely few coprophagous beetles have hitherto, we believe, been found in Australia; and the scarcity of

Fig. 80.

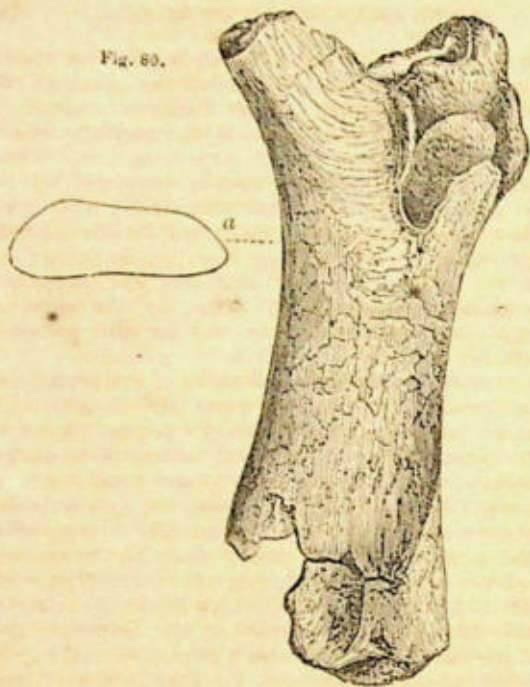


Fig. 82.

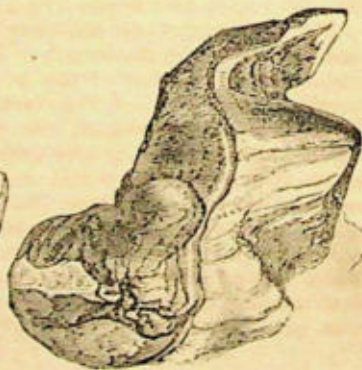


Fig. 81.

such is readily explained by the absence of native species of large herbivorous mammals; but the dung of the mastodontoid quadrupeds which formerly existed in Australia must then have afforded the requisite conditions for a greater abundance of such *colcoptera*. These and other speculations are naturally suggested by the highly interesting fossils here described. The great importance of such organic remains will be obvious from the few inferences which have been briefly noted; our obligations to the enlightened collector and transmitter of the mastodontoid fossils are great, and the arrival of additional facts and specimens will be most earnestly welcomed."

A consideration of the fossil relics of extinct animals throws the mind back upon remote periods before the surface of our globe had acquired its present aspect, its present arrangement of land and water, of mountains and plains, islands and continents; and when we begin to review the history of its phases, we find ourselves carried back into the obscure of time, till—in comparison with the ages which have passed since the commencement of the Primary period, wherein those oldest rocks were formed in which there are no traces of animal or vegetable life, to the conclusion of the Secondary geological period—the date of man's existence on the globe seems but of yesterday, and the few thousand years through which he has played his part sink into a span.

But though the vast antiquity of the globe is clearly demonstrated, still the length of time which has elapsed during the formation of the whole or of any definite portion of the crust of the earth is a problem yet to be solved. We know that at one period life had no place on our planet. The gneiss and mica-schist systems of strata of the Primary period are destitute of all trace of organic remains. In these, the most ancient of rocks, which exhibit to us the combined effects of igneous and aqueous agency, no fossil relics speak of a Fauna or Flora during their formation, and we may believe that few or none of the organised wonders of nature were then in existence, because the physical conditions of the

globe requisite for the existence of animals and plants were not then established.\* How long did this state of the earth continue? It is a question which cannot be answered. Passing from the primeval rocks,

“Where the bird dared not build, nor insect wing  
Flit o'er the herbless granite,”

we come to the Snowdon rocks of argillaceous slate, and the calcareous and argillaceous rocks, constituting the Cambrian system, in which a few traces of organic life have been detected, but of organic life in its lowest type. Then the Silurian or transition system succeeds, consisting of sandstones, limestones, and shale; here corals, crinoidea, trilobites, terebratulæ, &c., all belonging to extinct species, and often to extinct genera and families, and all aquatic, are abundant. From these systems of the primary strata, we advance to the secondary strata—rich in oceanic life—divided into the carboniferous system, the saliferous or new red-sandstone system, the oolitic system, and the cretaceous or chalk system. The deposits constituting each of these systems are replete with organic remains, but all of extinct species and often of extinct genera. The coal-measures are rich in an extinct Flora, principally consisting of ferns, often in an extraordinary degree of preservation, the most delicate leaves being spread out, and so arranged as to constitute a beautiful Hortus Siccus of a long-past period. About 300 species of plants have been discovered in the coal-measures of this and other countries. Their luxuriance indicates a genial temperature and a humid ground. “It would hardly be credited,” says Professor Lindley, in his ‘Fossil Flora of Great Britain,’ “by persons unacquainted with the evidence upon which such facts repose, that in the most dreary and desolate regions of the present day there once flourished groves of tropical plants, of Coniferæ, like the Norfolk Island and Arau-

\* We exclude microscopic animalcules from our consideration, because at present we scarcely know under what circumstances they can live.

carian pines, of bananas, tree-ferns, huge cacti and palms; that the marshes were filled with rush-like plants 15 or 20 feet high, and the coverts with ferns like the undergrowth of a West India island.

The chalk system is rich in extinct corals, zoophytes, and echinoderms. Our lofty chalk hills and the white cliffs of Dover have been formed through a long succession of ages at the bottom of a deep sea. From the Secondary we advance to the Tertiary periods. In general, says a talented writer, "No contrast can be more complete than that between the secondary and the tertiary rocks; the former retaining so much uniformity of character, even for enormous distances, as to appear like the effect of one determined sequence of general physical agencies: the latter exhibiting an almost boundless local variety, and relations to the configuration of land and sea not to be mistaken. The organic bodies of the secondary strata are obviously and completely distinct from those of the modern land and sea; but in the tertiary deposits, it is the resemblance between fossil and recent kinds of corals, shells, plants, quadrupeds, and other vertebrata, which first arrests the judgment. In general there is a decided break between the two groups of rocks, a discontinuity which is nowhere completely filled. Yet besides the pseudo-tertiary or transition chalky rocks of Maestricht and the Pyrenees, and the conchiferous marls of Gosau, we have in England and France above the chalk a prevalence of green and ferruginous sands similar to those below. Perhaps they have been derived from the waste of those older rocks. Mr. Lyell supposes the tertiaries of the London basin to have been formed from the waste of the secondary strata of Kent, Surrey, Sussex, and Hampshire. With the tertiary system came into existence, if we may trust the evidence which the earlier strata present, many races of quadrupeds, some birds, reptiles, and fishes, extremely analogous to, though for the most part specifically distinct from, the modern denizens of land and water; thousands of corals, shells, crustacea, &c., which present with living races quite as great analogy as obtains be

tween the tribes of the Atlantic and the Pacific oceans of our day. The general features of land and sea as they now exist began to appear, and there can be no doubt that in a philosophical study of the revolutions of the globe the tertiary era of geology cannot be properly separated from the existing system of nature." The tertiary period, taken in this extended sense, saw the creation and extinction of the mammoth, the mastodon, the palæotherium, the fossil rhinoceros and hippopotamus, the dinotherium, the toxodon, and the huge pachyderm of Australia; and next, the creation of all our modern races of animals.

During the period of the deposition of the tertiary strata, the relations of land and sea were greatly altered in various portions of the globe; in Europe by the rising of the Pyrenees beyond the height they reached after the cretaceous era, and by the uplifting of the Alps from the Mediterranean towards Mont Blanc. "In England we may believe the upward movement of the southern counties connected with the Hampshire axis of elevation and the Isle of Wight convulsion was ended at an early epoch of the tertiary period. The eastern range of the Alps from Mont Blanc to Vienna is of later date, and may be viewed as the most marked phenomenon of elevation which accompanied or preceded the dispersion of erratic blocks in Europe."

Besides the alterations thus produced in the relation of the land and the sea, changes have taken place, and are still in progress, from other causes. Rivers bring down vast quantities of the disintegrated particles of the strata through which they flow, and deposit the sediment at their mouths, forming deltas, or low tracts, won as it were particle by particle from the domain of the ocean; on the other hand, the sea itself wears down coasts to a great extent, making vast inroads on the land, and converting the isthmus into an island: sometimes, by the sudden or gradual elevation of a large tract of land, an inland sea becomes drained, leaving in its place a sandy desert. In the depths themselves there is no rest; multitudes of zoophytes and testacea there live and die,

there their remains accumulate layer upon layer, forming beds of vast thickness, which at a future day may be laid bare, covered with alluvium, and engage the researches of another Cuvier. The chemical action of the atmosphere; heat and cold, rain and snow, winds, springs, rivers, torrents, the action of the tides; life, animal and vegetable; and volcanic agencies, all contribute their part to alter the surface of the land, and to effect changes in its relative extent to that of the sea—changes which are in reality never stationary, but, imperceptible as they may seem, in constant progress.

The deposits of the Tertiary period are divided by Mr. Lyell into three series: the oldest, or Eocene, in which there occurs from three to five per cent. of existing species of shells; secondly, the series of the middle age, or Miocene, averaging 18 per cent. in the occurrence of existing species of shells; and thirdly, the superficial or Pleiocene deposits, in which the ratio of existing shells is from 40 to 95 per cent.

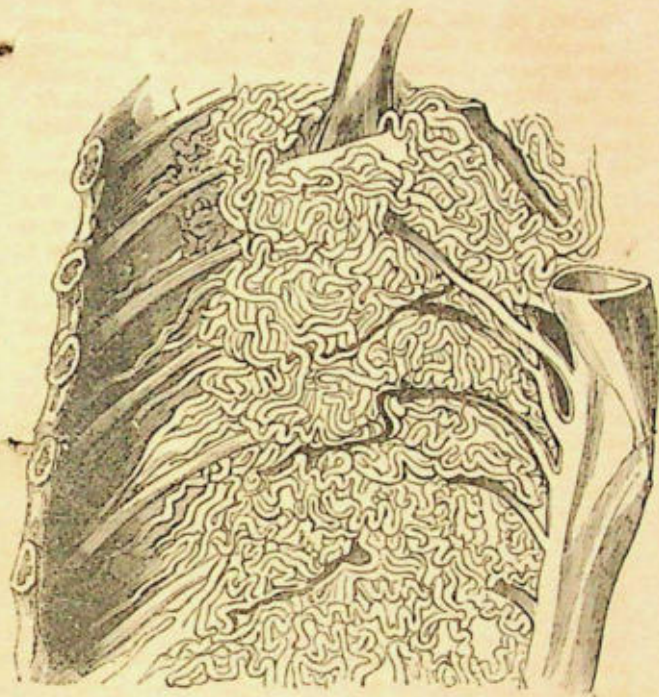
We trust we shall be pardoned for this brief digression, into which we were led by a desire to show that fossil relics are not all of the same era, and that Primary, Secondary, and Tertiary periods have each their distinguishing characteristics, their own fossil relics; that on the whole the progression of life has been from the lowest aquatic forms, to forms analogous to those now tenantry the earth, which, when they existed in the Eocene, Miocene, or Pleiocene epoch of the Tertiary period, must have presented to a certain extent the superficial features it at present exhibits, though there were doubtless great modifications in the arrangements of land and water, and in the temperature of given latitudes. We beg to refer our readers to the articles 'Organic Remains' and 'Geology,' in the 'Penny Cyclopædia.' The perusal will give additional interest to our details of fossil relics.

#### Tribe—AQUATIC PACHYDERMATA

(The *Herbivorous Cetacea* of Cuvier).—If our readers will turn to our account of the fossil *dinotherium* and

toxodon, pp. 104 and 111, he will find that we have there alluded to the dugong or duyong, and the lamantin (the Aquatic Gravigrades of Blainville), as belonging to the pachydermatous order, and as having in manners and organization little relationship to the true whales, excepting in so far as they are alike modified for the waters of the deep.

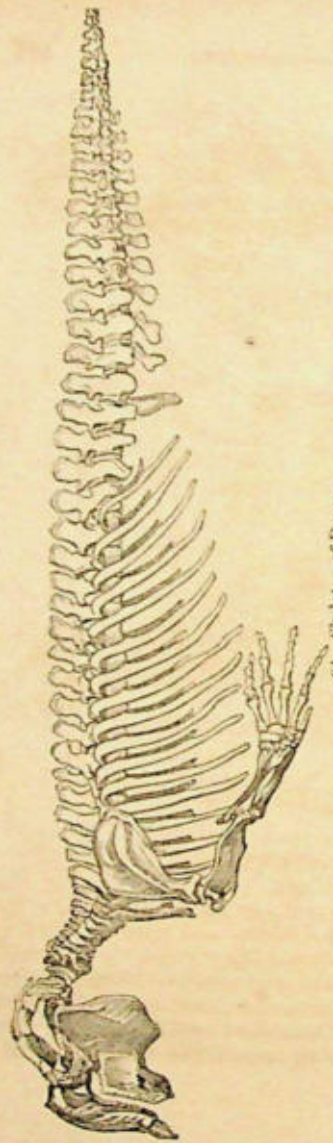
In their external form, indeed, these aquatic pachyderms are whale-like: there are no hinder limbs, the pelvis being either rudimentary or wanting, and the fore limbs are converted into flippers or paddles; the body is continued conical till it terminates in a transverse or horizontal tail, consisting of an expanse of cartilage covered with tendinous fibres and skin, and which is the chief organ of aquatic locomotion. The skin is almost naked, oily, and covers a layer of subcutaneous blubber or fat; the lips are studded with thick wiry bristles. Although the nasal opening is placed high on the skull, the nostrils in the skin are placed at the extremity of the muzzle, which is remarkably obtuse and truncate—a form advantageous for the browsing habits of these animals, which feed on submarine vegetables. The eyes are protected by a membrana nictitans, and the teats in the females are situated just behind the roots of the flippers—two points of difference between these aquatics and the whales. The stomach is sacculated; the teeth present flat bruising surfaces; there are no intercostal and intra-vertebral arterial plexuses, as in the true Cetacea. (Fig. 83.) The bones of the skeleton are of dense texture and destitute of medullary cavities; they are not loaded with oil, as in the Cetacea. In the Indian dugong there are seven cervical vertebræ, nineteen costal vertebræ, and thirty lumbar, pelvic, and caudal. In the dugong of the Red Sea the lumbar, pelvic, and caudal vertebræ amount to thirty-three; making in all fifty-nine. The number of the ribs is nineteen on each side. The lower jaw is articulated to the cranium by a true synovial capsule, reflected over cartilaginous surfaces, and not, as in the true Cetacea, by a coarse oily ligamentous substance. In the lamantin, or manatee, the



83.—Vascular Apparatus of Whale.

ribs are sixteen on each side. Fig. 84 represents the skeleton of the dugong, and Fig. 84\* that of the manatee. They may be compared together, and with the skeleton of the porpoise, Fig. 94\* (a true cetacean), with advantage.

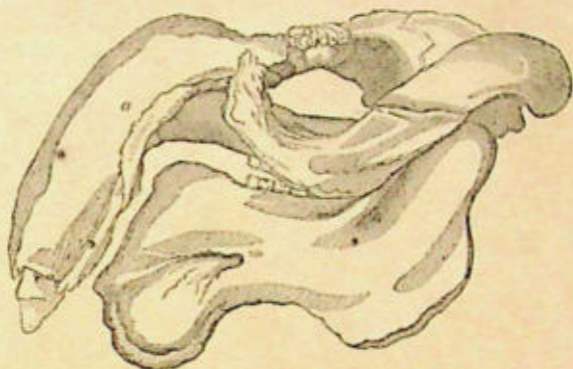
Fig. 85 represents the skull of the dugong; Fig. 85\*, that of the manatee. The skull of the manatee may be distinguished from that of the dugong by the following particulars:—The nasal bones are very small, and imbedded, so to speak, in the frontal, which consist of two



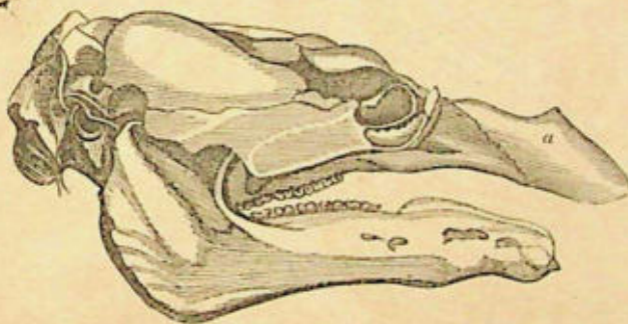
84.—Skeleton of Dugong.



84\*.—Skeleton of Mastotia.



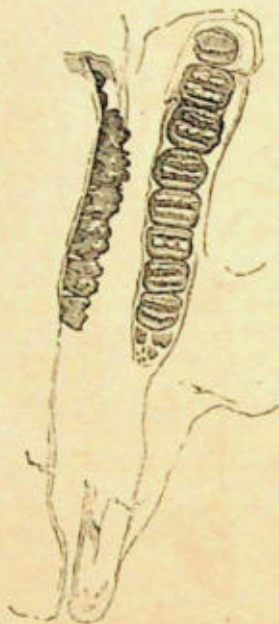
85.—Skull of Dugong.



85\*.—Skull of Manatee.

portions advancing forwards, so as to enter into the upper margin of the nasal orifice, and form the ceiling of the orbits. The intermaxillary bones (*a*) advance far forwards, but are destitute of teeth, excepting during the early stages of the animal's existence; these bones form the lateral edges of the nasal orifice, which is very spacious; but in the living animal the bones are con-

tinued by a cartilaginous addition, so that the nostrils open at the end of the muzzle. The orbits are situated far forwards, and their margin is very prominent; the zygomatic arch is broad and strong; the muzzle advances directly forwards with a very slight gradual downward bend. The dentition of the manatee (Fig. 86) is not

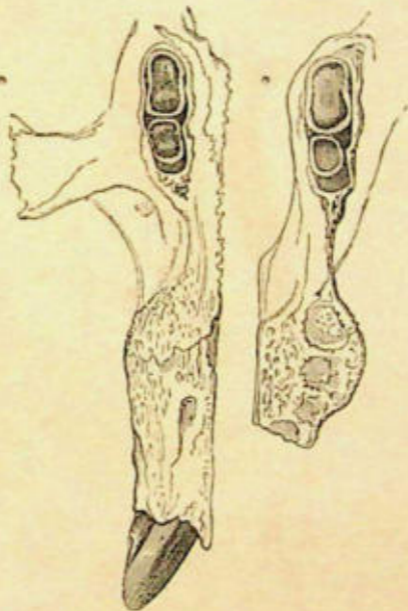


86.—Teeth of Manatee.

correctly ascertained. In adult skulls eight molars on each side are usually found, in others nine or ten; and Fred. Cuvier observes that, as in some of the ordinary Pachydermata, the anterior molars, worn the first, fall

as the posterior ones become developed, being, indeed, pushed out by their advance.

The skull of the dugong (Fig. 85) is distinguished by the enormous size of the intermaxillary bones, *a*, which extend backwards as far as the middle of the temporal fossæ, and are bent down with a sudden angle (re-



87.—Teeth of Dugong.

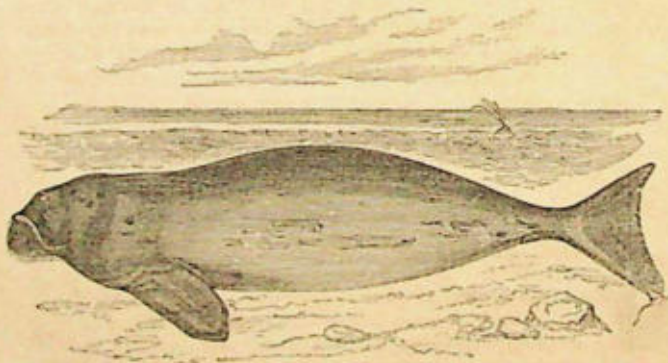
minding us of the beak of the flamingo) over the elongated symphysis of the lower jaw. In this deflected portion of each intermaxillary bone is lodged the root of a permanent, tusk-like, but not very prominent incisor, there being two of these teeth above, none below. This development and shape of the intermaxillary bones throws

the nasal orifice higher up than in the manatee: the lower jaw is thicker, shorter, deeper, and its symphysis fits the deflected portion of the intermaxillary bones. In the young dugong the molars are five on each side, above and below; but the three anterior are deciduous, the two last being permanent (see dentition, Fig. 87). To those who wish to investigate the anatomy of this animal we recommend a paper by Professor Owen, in the 'Zool. Proceeds.' for 1838, p. 28.

### THE DUGONG

(*Halicore Dugong*, F. Cav.; *Halicore Indicus*,  
Desmarest).

This species is a native of the Indian seas, being common among the islands of the Indian Archipelago, and visiting also the coasts of New Holland. (Fig. 88.) Its favourite haunts are the mouths of rivers and straits between proximate islands, where the depth of water is but trifling (three or four fathoms), and where, at the bottom, grows a luxuriant pasturage of submarine algæ and fuci: here in calm weather may small troops be



88.—Dugong.

seen feeding below the surface, and every now and then rising to take breath. The position of the mouth, the muscular powers and mobility of the lips garnished with wiry bristles, and the short incisor tusks of the upper jaw, enable these animals to seize and drag up the long fronds of the subaquatic vegetables which constitute their nourishment.

The dugong (more properly duyong) is in high esteem as an article of food, its flesh being tender and not unlike beef; hence it is hunted assiduously by the Malays, who attack the animal with harpoons, in the management of which they are very dexterous.

The mutual affection of the male and female is very great, and the latter is devoted to her offspring. If a dugong be killed, the survivor of the pair, careless of danger, follows after the boat, carrying the body, impelled by an overmastering passion, and thus often shares the fate of its partner; indeed, if one be taken, the other is an easy prize.

The dugong attains to the length of seven or eight feet; its caudal paddle is crescent shaped; the large thick upper lip hangs over the lower; the skin of the body is thinly set, with very short prickly bristles; the anterior limbs, or flippers, are destitute of nails. The ventricles of the heart are not united together, but form as it were two distinct hearts joined at the top: this separation of the ventricles does not alter the routine of the circulation. The eyes are very small.

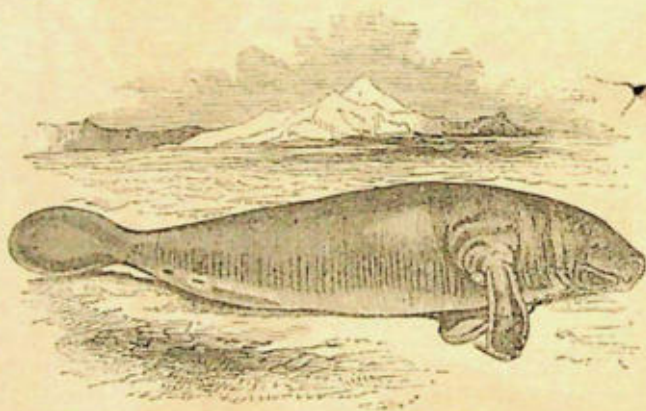
An allied species (*Halicore Tabernaculi*) has been discovered by MM. Ehrenberg and Rüppel in the Red Sea.

#### THE MANATEE, OR LAMANTIN

(*Manatus Americanus*; *Trichecus Manatus*, Linn.).

The American manatee inhabits the embouchure of the Amazon, Orinoko, and other rivers of South America, and feeds upon subaquatic herbage. Its flippers exhibit rudiments of nails, and by their aid it sometimes drags its unwieldy body on shore, and crawls up the banks,

either to bask in the sun or seek for terrestrial vegetables. (Fig. 89.) The males and females are mutually attached to each other, and the latter are tenderly devoted to their young, which soon after birth they carry under their flippers, where the teats are seated. This species measures from six to seven feet in length; the head is small, the muzzle thick and fleshy, presenting at its extremity a semicircular disc, at the upper part of which are the nostrils, semicircular orifices, directed forwards. The eyes are small; the aperture of the auditory canal almost imperceptible. From the shoulders the body gradually diminishes, and terminates in a flat, horizontal, oval paddle.



89.—Manatee.

A distinct species (*Manatus Senegalensis*, Desm.) is found in the embouchure of the Senegal and other rivers of Western Africa; its manners resemble those of the preceding, but we have no very precise details.

According to Dr. Harlan, a distinct species of manatee, which he terms *Manatus latirostris*, inhabits the shores of some parts of North America.

## ZEUGLONDON.

The fossil teeth here represented were discovered by Dr. Harlan in America, and attributed by him to an extinct reptile, which he termed *Basilosaurus*. Professor Owen, however, proves them to belong to an extinct animal referable to the present tribe, and allied to the manatee and dugong; and for this animal he has proposed the name of *Zeuglodon*, a word suggested by the form of the posterior molars, which resemble two teeth tied or yoked together. (Fig. 90.) *a* represents the



90.—Fossil Teeth of Zeuglodon.

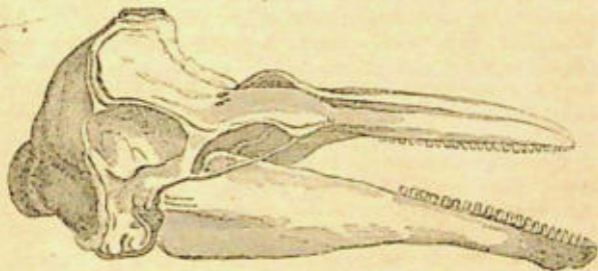
cut surface of one of these teeth, each part exhibiting a central pulp-cavity, and concentric striae of growth. For minute details see 'Mag. Nat. Hist.' May, 1839, p. 209.

## ORDER—CETACEA.

THE Cetacea are characterized by the conical fish-like form of the body, covered with a smooth naked skin, adapted for the medium in which they live; between the skin and the muscles is a layer of blubber, varying in thickness in different species, and most abundant in the Greenland whale, its thickness being from eight or ten to twenty inches. The uses of this layer are various: in the first place, it renders the huge body of these animals specifically lighter than the surrounding fluid; secondly, it materially tends to the preservation of the vital heat; and, thirdly, it affords protection to the internal organs against the effects of the enormous pressure to which these animals are subject while plunging deep into the abysses of the ocean. The fore limbs are modified into flippers, and the posterior part of the body, destitute of hind limbs, is continued conical, and terminates in a broad horizontal cartilaginous paddle. On the central line of the upper surface, and generally towards the tail, is sometimes seated a small vertical cartilaginous fin, unconnected with the skeleton. This fin varies in figure, and is often absent. It is partly by the aid of this fin, where present, but more so by that of the flippers, that the Cetacea balance themselves in the water, for when dead or dying they float on the side or the back. The mode of progression consists of a series of leaps or impulses produced by the action of the tail, which is bent down and then struck out with greater or less violence, according to the rapidity with which the animal is cleaving its way. By means of this organ it can dive instantaneously, or even leap out of the water, throwing the waves around into spray and foam. In the ordinary position of the Cetacea while floating, only the top of the head and part of the back appear above the surface,

their capacious jaws, and also the eyes, being beneath; hence, in order to admit of uninterrupted respiration, the situation and structure of the nostrils are modified accordingly.

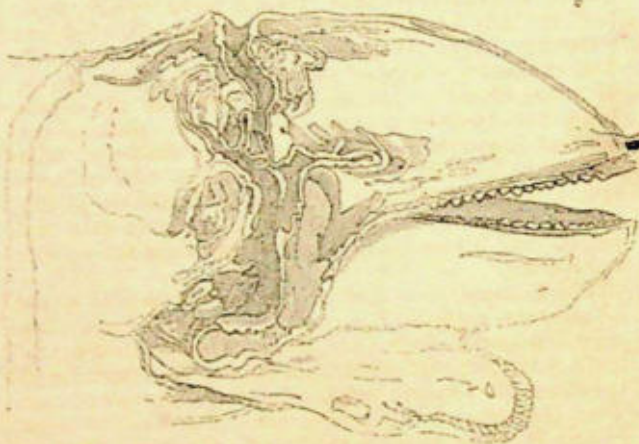
These animals are called blowing Cetacea, because, in consequence of the structure of the nostrils, they are capable of throwing up jets of water or spray accompanied with a loud noise; this act is termed blowing, and the nasal orifices blow-holes or spiracles; they open on the top of the head, and lead to two large membranous pouches seated immediately below the integument. These pouches are receptacles for fluid, which, being forced up into them, is prevented from returning into the throat by certain valves furnished with strong muscles, lodged above the intermaxillary bones (see Fig. 91,



91.—Skull of Dolphin.

the skull of the Dolphin); it is in the hollow at the top of the head that these pouches are placed. The posterior nasal passage is furnished with longitudinal and circular muscular fibres, and opens into the pharynx, or back part of the mouth; and into it the larynx rises in the form of a pyramid, and the circular fibres of the nasal passage have the power of grasping it by their contractions. The channel, therefore, from the larynx through the posterior nasal passage into the pouches is plain. Now these pouches are lodged, as we have said, beneath

the skin, and the nostrils which conduct to them open externally by a transverse semilunar slit, while very strong muscular fibres, radiating from the entire circumference of the cranium, cover the whole surface of the apparatus, and act as compressors of the pouches. Let us suppose, says Cuvier, "that the cetaceous animal has taken into its mouth some water which it wishes to eject; it moves its tongue and jaws as if it were about to swallow, but, closing the pharynx, it forces the water to mount into the nasal passage, where its progress is ac-



92.—Section of Head of Porpoise.

celerated by the action of the circular fibres, until it raises the valves and distends the membranous pouches above. Here it can be retained until the animal wishes to eject it and take in breath. In order to spout, the valves being closed, it forcibly compresses the pouches by means of the muscular expansions which cover them; and, compelled to escape by the narrow crescentic aperture, it is projected to a height corresponding to the force of the

pressure." The noise, however, called blowing, shows that the animal forcibly exhausts its lungs of the pent-up breath, driving the air through the nasal orifices, which, mingled with the water contained in the pouches, rises like spray or dense midst. Fig. 92 represents a section of the head of the porpoise, showing the structure of the nasal apparatus. This apparatus is of little use as an olfactory organ, the sense of smell being very deficient. As respects the organs of sight, we may observe that the eye is very small, and adapted, as in fishes, to the density of the surrounding medium, the cornea being flat, and the crystalline lens globular; there is no lachrymal gland, but the lids are furnished with certain little glands secreting a fluid adapted for lubricating the eyeball. The external aperture of the ear is minute and capable of being closed at pleasure. Under water the whale hears the smallest sounds, the slightest splash of the oar, but to sounds in the air above, even the report of a cannon, as Scoresby states, it is insensible. Its auditory apparatus, enclosed in a bone (petrous portion of the temple) remarkable for hardness, appreciates only the vibration of water. The sense of taste does not appear to be acute.

The Cetacea, passing their existence in the wild waste of seas, are capable of remaining submerged for a considerable length of time, and the vascular system is modified accordingly, the arteries not only of the limbs, but of the chest and vertebral canal, being singularly plexiform. The discovery of this arrangement is due to the celebrated W. Hunter, who published an account of it in the *Phil. Trans.* 1787. These animals, he says, "have a greater proportion of blood than any other known, and there are many arteries apparently intended as reservoirs where a larger quantity seemed to be required in a part, and vascularity could not be the only object. Thus we find that the intercostal arteries divide into a vast number of branches, which run in a serpentine course beneath the pleura (lining membrane of the chest), the ribs, and their muscles," forming a deep maze of intermingled and contorted tubes. "These vessels, everywhere lining

the sides of the thorax, pass in between the ribs near their articulation, and also behind the ligamentous attachment of the ribs, and anastomose with each other. The spinal cord is surrounded with a network of arteries in the same manner, more especially where it comes out from the brain, and where a thick substance is formed by their ramifications and convolutions. Fig. 83 represents the arrangement of the arteries of the chest.

Nor is this plexiform arrangement peculiar to the arterial system; it is even more strongly displayed in the venous; the veins in certain parts forming immense plexiform reservoirs. This curious disposition of the vascular system in the Cetacea is, as we have intimated, most probably connected with their habits of diving, during which their respiration is suspended, and consequently the passage of the blood through the lungs impeded; while at the same time they are subjected to a great pressure. Hence perhaps the arterial plexuses are needed as reservoirs stored with oxygenated blood for the use of the system, while the venous plexuses are reservoirs for the sake of safety during the suspension of respiration.

The females of this order have two teats deeply imbedded at the lower portion of the abdomen. The stomach is very complicated, divided into several compartments, and digestion is very rapid.

As these animals have to plough the waves head foremost, a long or even decided neck would interfere with their movements, consequently the cervical vertebrae are compressed into a small space, and more or less entirely ankylosed into one mass, to the total immobility of the head, the axis of which cannot be altered without a corresponding alteration of that of the body. It is moreover remarkable that the two halves of the head do not precisely correspond in symmetry. This is especially observable in the dolphins, porpoises, grampus, and cachalot. (See Mechel's 'Anatomie Comparée,' vol. iv. p. 361.)

The Cetacea are all carnivorous, but their prey differs from the small mollusk to fishes and even the smaller of

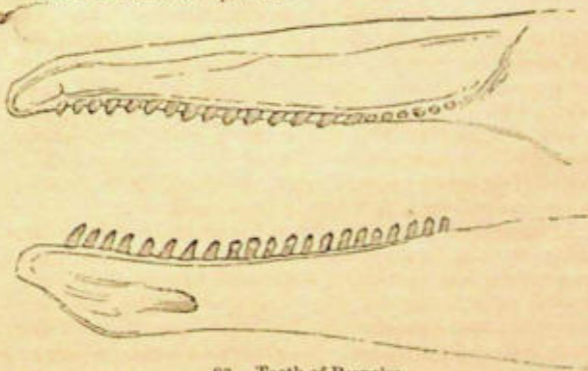
their own order; and their teeth are modified accordingly. They are divided into the following families:—

1. *Delphinidæ*, Dolphins, Grampuses, Narwhals, &c.
2. *Catodontidæ*, Cachalots, or Spermaceti Whales.
3. *Balenidæ*, Rorquals and Blubber Whales.

FAMILY—DELPHINIDÆ (Dolphins, Porpoises, &c.).

THE COMMON PORPOISE (*Phocæna communis*).

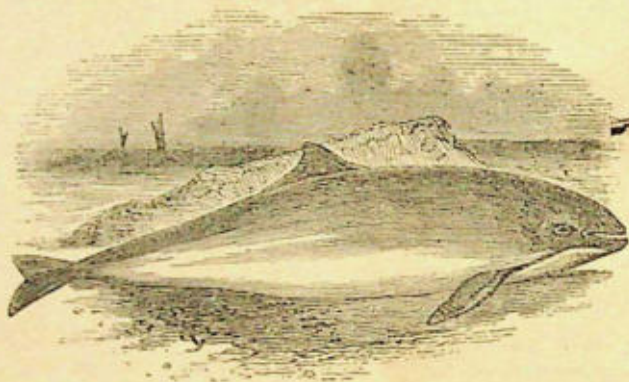
In the genus *Phocæna* the snout in the living animal is not produced as in the dolphin; but in other respects the characters are the same. The teeth are numerous, compressed, rounded, and interlock when the jaws are closed, and are well fitted for snapping at and retaining the slippery prey. (Fig. 93.) A dorsal fin is present. There are several species.



93.—Teeth of Porpoise.

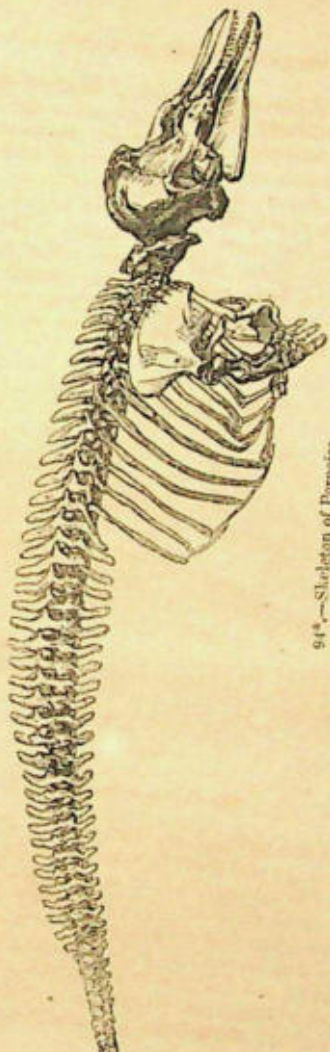
The common porpoise is active, fleet, and voracious; it frequents, in troops, the bays and inlets of our coast, and especially the mouths of rivers, not unfrequently advancing to a considerable distance up their stream. (Fig. 94.) In such places it is often taken in nets by the fishermen, becoming entrapped while eagerly pursu-

ing its prey. When the shoals of herring and other fish which periodically visit our coast make their appearance, they are harassed, among other enemies, by this active and voracious animal, which revels in the luxury of a perpetual feast; and as its appetite is enormous and its digestion rapid, the slaughter in which it appears incessantly occupied must be very great. The porpoise is common at the Nore, and few have sailed to Margate or Ramsgate who have not seen these animals tumbling along, as they appear to do, in the rushing waves. The peculiarity of their motion results from the horizontal



94.—Common Porpoise.

position of the tail-paddle, and the up-and-down stroke which it gives; and their momentary appearance is for the purpose of breathing, which accomplished, they plunge down in search of their food. In former days the flesh of the porpoise was highly esteemed as a delicacy for the table, and was served at public feasts; indeed, it is but lately that it has fallen into disrepute, and been omitted at City entertainments, where the turtle usurps its place. Our forefathers must have had a different notion about



94<sup>a</sup>.—Skeleton of Porpoise.

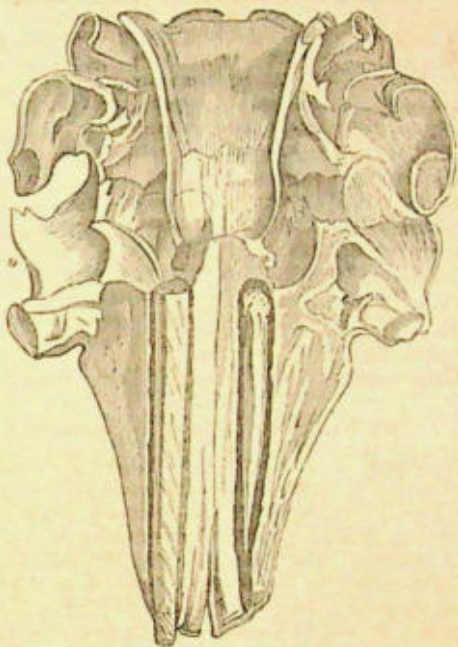
table delicacies from ourselves; for few, we believe, would now relish the rank, oily, fishy flesh of this animal. Length about five feet. Fig. 94\* represents the skeleton.

Fig. 91 represents the skull of the dolphin (*Delphinus Delphis*), a species celebrated by the ancients, and resembling the porpoise in its habits and food. The aquatic evolutions of these animals, as seen sporting around ships, apparently for the sake of amusement, their varied and rapid turns, and gambols, are well described by Ovid—

“Undique dant saltus, multaque adspergine rorant;  
Emerguntque iterum, redeuntque sub æquora rursus,  
Inque chori ludunt speciem, lascivaque jactant  
Corpora, et acceptum patulis mare naribus efflant.”

#### THE NARWHAL (*Monodon monoceros*).

The genus *Monodon*, of which the narwhal is the only recognised species, is provisionally placed by Cuvier in the family *Delphinidæ*. It evidently forms the type of a distinct group. Among the *Cetacea* inhabiting the dreary realms of the Polar Ocean, the narwhal, if not the largest or among the largest, is nevertheless one of the most remarkable: its general form resembles that of the porpoises; it has, however, no teeth, properly so called, but two ivory tusks, or spears, implanted in the intermaxillary bone, but of which the right remains usually rudimentary and concealed during life. The left tusk, on the contrary, attains to the length of from five to seven or eight and sometimes ten feet in length, and projects from the snout in a right line with the body, tapering gradually to a point, with a spiral twist (ropelike) throughout its whole extent (Fig. 95, where, by an oversight, the tusks have been transposed). In its structure and growth this tusk resembles that of the elephant, being hollow at its base or root, and solid at its extremity. It is in the male only that this spear-like weapon, under ordinary circumstances, becomes duly developed, the females (and indeed the young males) having the left as



95.—Skull and Tooth of Narwhal.

well as the right tusk concealed within its bony socket. This rule, however, is not invariable, for females have not only been seen with the left tusk projecting, but the right also, if we may credit the account of Lacépède, who states that Captain Direk Peterson, commander of a vessel called the Golden Lion, brought to Hamburg, in 1689, the skull of a female narwhal, having two tusks implanted in it, of which the left measured seven feet five inches, the right seven feet. It may be added that Captain Scoresby brought

home the skull of a female narwhal in which both tusks projected, though only to the distance of two and a quarter inches, and which was examined by Sir E. Home. Nor with respect to the male must it be supposed that the right tusk never becomes developed, for, on the contrary, instances sometimes occur in which the right tusk projects externally nearly as far as the left; and there are grounds for supposing that, when the left becomes lost, or broken by accident, the right tusk becomes developed to supply the deficiency. Formerly these horns, or tusks, were looked upon to be the horns of the fabulous *lard-unicorn*, and therefore they were valued as an inestimable curiosity, and sold excessively dear, till the Greenland fishery was set on foot, when they became more common, and their real nature known.

The use assigned to the tusk of the narwhal by Crantz, viz. that of uprooting marine vegetables on which to feed, is altogether a supposition. As the male only has the instrument developed, or generally the male, the female must be reduced to sad difficulties in the procuring of food; but in truth the position of the tusk renders such a use as is here attributed to it impossible. Moreover the narwhal does not subsist on marine fuci, or algæ, but on soft animal matters, as mollusks and fish. Captain Scoresby found the remains of cuttle-fish in the stomachs of several which were opened by him, and similar remains were also found in the stomach of one driven ashore near Boston.

In general form the narwhal resembles the porpoise, but the head is small and blunt; the mouth is small, and not capable of much extension. The under-lip is wedge-shaped. The eyes are placed in a line with the opening of the mouth, at the distance of thirteen or fourteen inches from the snout, and of small size, being about an inch in diameter. The spiracle, or blow-hole, is a single orifice of a semicircular form, on the top of the head, directly over the eyes. The fins, or flippers, are about fourteen or fifteen inches long, and from six to eight broad: their situation on the sides of the animal being at one-fifth of its length from the snout. The breadth

of the tail is from fifteen to twenty inches. There is no dorsal fin, but a sharp ridge runs down the centre of the back, the edge of which is generally found to be rough, and worn, as if by rubbing against the ice. At an early age the narwhal is blackish gray on the back, with numerous darker spots and markings running into each other, forming a general dusky black surface. The sides are almost white, with dusky and more open markings; the under surface is white. In adult specimens the ground-colour of the back is yellowish-white, with markings varying from dark gray to dusky black, and of a roundish or oval figure, with interspaces of white or yellowish-white between them. The skin resembles that of the common Greenland whale (*Balæna mysticetus*), but is thinner. (Fig. 96.) The female narwhal produces a single young one at a birth, which she nourishes with milk for several months.



96.—The Narwhal.

To the rapidity, the great powers, and the ferocity of the narwhal when attacked, many writers have borne testimony. Its form is admirably adapted for cleaving the waters, and we can well believe that the shock of its weapon, driven full tilt against an enemy, must produce a terrible effect. The ribs of the stoutest boat would

be transfixed by the dint of such a blow, far more easily than was ever shield by the lance of knight in battle or tournament. Several instances have indeed been known in which the animal has plunged his weapon deep into the thick oak timbers of a ship, when it has fortunately snapped short, the fragment remaining fixed in the orifice, so as to plug it up. A portion of wood taken from the hull of a ship with a piece of narwhal's tusk firmly imbedded in it came some few years ago under our own inspection. It is probably only in defence of the females and their young, unless indeed when attacked himself, that the male narwhal thus rushes against ships or boats; for we utterly discredit the usual accounts of its causeless and indiscriminate attacks upon any object which approaches within its range. Doubtless when wounded and harassed it becomes desperate; and its power, its velocity, and weapon combine to render it formidable.

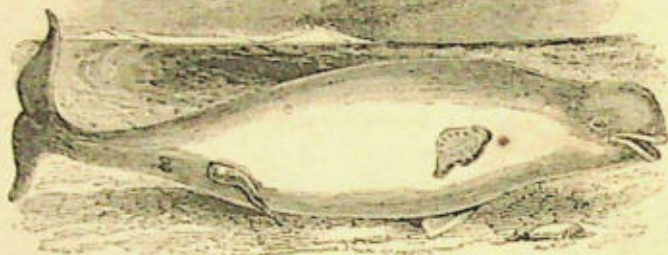
The narwhal is gregarious, associating in troops of from six or eight to twenty or more; and numbers are often seen clustered together, both in the open sea, and in bays and inlets free from the ice, forming a compact phalanx, moving gently and slowly along. Under such circumstances the independent movements of each individual are necessarily embarrassed, so that a considerable slaughter may be easily effected among them. When attacked at such a time, the hind ranks, instead of turning against their assailants, press upon those before, sliding their long weapons over the glossy backs of their leaders, and all becomes disorder and confusion. Opportunities of this kind are welcome to the Greenlanders, to whom the narwhal is an important animal. Independently of the oil, which the narwhal yields in considerable quantity and of excellent quality, the flesh is much esteemed by these people as food, and eaten both fresh and in a dried and smoked state, being prepared over the fire of their huts. The tendons of the muscles are useful in the preparation of thin but tough cordage; and Duhamel states (see his '*Traité des Pêches*') that several membranous sacs are obtained from the gullet, made use of as parts

of their fishing apparatus. The ivory spear, or tusk, the Greenlanders employ in various household and economical purposes instead of wood, and in the manufacture of weapons, as darts or arrows, &c. When struck by a harpoon, the narwhal dives with great velocity, and in the same manner as the whale, but not to the same extent. In general it descends about 200 fathoms; and on returning to the surface is despatched by a whale-lance without any difficulty. The blubber is about three inches in thickness, and invests the whole body: it affords about half a ton of oil.

The narwhal may be registered among the occasional visitants to the British shores. Of its visits, however, only three instances are on record, as far as we can learn. The first is recorded by Nicolas Tulpius in 1648. The second is of one killed, in 1800, near Boston, in Lincolnshire, and said to have been twenty-five feet in length. The third instance occurred in 1806, at the Sound of Weesdale, in Shetland.

#### THE BELUGA (*Delphinapterus Leucas*, Pall.).

The genus *Delphinapterus* is characterized by the presence of a dorsal fin. Head small and blunt; teeth variable in number. The beluga (White Fish, or White Whale) is a native of the high northern latitudes, and is one of the most beautiful, confident, and active of its race. Its colour is clear milk-white, sometimes tinged with a rose-colour or a slight wash of yellow, and the skin is very soft, smooth, and slippery. It associates in small troops or families, and is in the habit of following and surrounding boats or ships, gambolling like the dolphin around them; or chasing its finny prey, in quest of which it often ascends the mouths of rivers, occasionally to a considerable distance. (Fig. 97.) During the intense severity of the winter, the beluga is said to migrate southwards; this journey cannot, however, be to any great extent, as it very rarely occurs in the sea around the most northern portion of the British Isles. Indeed we do not know of more than one instance on record of



97.—Beluga.

his species visiting our coasts; we refer to the individual taken, in the summer of 1815, in the Frith of Forth, where it had been observed for nearly three months ascending with the flood-tide and regularly descending with the ebb. This individual, as is proved by the time of the year in which it was seen, was a stray wanderer from its native latitudes, and not on a regular journey of migration. The flesh of this animal is eaten by the Greenlanders and other people of the boreal regions. Crantz says it is as red as beef, and of somewhat similar flavour; Pallas, that it is black. The carcase yields excellent oil, and it is principally for the sake of this that the beluga is hunted. It is sometimes intercepted by nets extended across the inlet or stream it has entered, and attacked with lances while endeavouring to force its return: on other occasions it is harpooned, and sometimes even caught by means of hooks baited with fish. The female produces one or two young at a birth, towards which she displays the strongest attachment; they follow her in all her movements, and do not quit her until they are of considerable size. Cuvier states that the teeth

are nine in number on each side, above and below. Mr. Bell states that, in a cranium in his possession, there are eight teeth in the upper and six in the lower jaw, on each side; but that, as two have evidently fallen from the former, there must have been ten originally. Aged individuals are often found without any teeth in the upper jaw. The beluga measures, when adult, seventeen or eighteen feet in length. That caught in the Frith of Forth measured thirteen feet four inches, and nearly nine feet in circumference at the thickest part, viz. the centre of the body, whence it tapers both to the head and to the tail.

FAMILY—CATODONTIDÆ (*Physeteridae*, Bell).

THIS family, which includes the Cachalots, is characterized by the immoderate size of the head, which equals one-third the length of the body, and terminates in a deep, abrupt, truncate snout, advancing beyond the lower jaw, which is narrow, the two rami being in contact for the greater part of their length, and armed each with a row of compressed, solid, conical teeth, at equal distances fitting into cavities in the upper jaw, which is either destitute of teeth, or merely furnished with a few in a rudimentary state and almost covered by the gum. The blow-holes open externally by a single orifice. The tongue is small and pointed.

THE COMMON CACHALOT, OF SPERMACETI WHALE

(*Physeter macrocephalus*, Linn.; *Physeter Catodon*, Linn.; *Catodon trumpe*, Lacépède; Blunt-headed Cachalot, Pennant).

The cachalot is one of the mightiest of the Cetacea, the adult male measuring upwards of seventy feet in length; and from its powers, and not unfrequent paroxysms of fury, is one of the most dangerous of the monsters of the deep which the daring sailor is called upon to combat. (Fig. 98.)

The cachalot roams the ocean at pleasure, and is seen

in all latitudes, but its native regions may be considered as the arctic and antarctic seas.\* It would seem that the animal is gregarious; and is generally seen in parties consisting of half-grown males, or of females attended by their young, and guarded by one or two males of the largest size. When solitary cachalots are observed, they invariably prove to be aged males.



98.—Spermaceti Whale.

According to Mr. F. De Bell Bennett ('Zool. Proceeds.,' 1837, p. 39), the speed of an alarmed cachalot does not exceed from eight to ten miles an hour, though when harpooned its temporary velocity may be estimated from twelve to fifteen miles. When thus flying from pursuit, the huge animal moves with a regular and majestic, although rapid pace, and with a gently leaping gait: the anterior and upper portions of the colossal head are raised above the water, and a portion of the back is also frequently exhibited. When parties are pursued, they often move in lines like a troop of horse, and exert all their movements, and descend, rise, and even spout in unison. When about to plunge deep, the cachalot assumes a vertical position, raising the caudal fin, or "flukes," perpendicularly in the air, an action that is

\* Baron Cuvier considers that only one species of spermaceti whale, or cachalot, exists. And Fred. Cuvier adopts this opinion, with some doubt as to whether the southern cachalot may not be distinct, which Mr. Bell regards as being the fact. As the elucidation of doubtful species is not our present object, we leave the question open, and speak of the cachalot in general terms as a native of the Northern and Southern oceans.

performed leisurely, and one that distinguishes this from most other species of Cetacea. This evolution is not, however, invariably performed, since, when tranquilly feeding, or carelessly avoiding a boat, the cachalot will descend very gradually, lowering itself, or, as it is technically termed, "settling down."

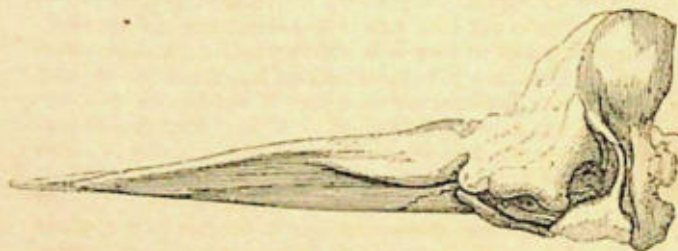
The ordinary length of time which the cachalot remains under water, when alarmed or wounded, is three-quarters of an hour, but in some instances the time has extended, it is said, to an hour and a quarter.

The chase of this animal is very hazardous, for although generally the troop fly on the appearance of danger, yet, when one is wounded, the others often come to the rescue, especially in the case of the females, which assist each other; while the males, as Mr. Bennett affirms, commonly make a speedy retreat. One of the latter, however, if attacked and infuriated, is extremely formidable, and will rush with immense velocity, head foremost, against a boat, shivering it to pieces, or, lashing with its tail, will cut it asunder, scattering the hapless mariners, some, perhaps, struck dead, others maimed, on the surface of the rolling ocean. Occurrences of this kind are indeed numerous, and many a thrilling narrative of the "hair-breadth 'scapes," and of loss of men and boats, in the close encounter with this giant of the waters, can an old South Sea whaler tell, and many have been recorded, which of themselves would fill a goodly and not uninteresting volume. Not only are the boats in jeopardy, but the "whaling vessel" itself is not secure:—Mr. Bell refers to an authenticated instance of an American ship of large size being stove in and foundered by a blow from a gigantic male cachalot rushing head foremost against it.

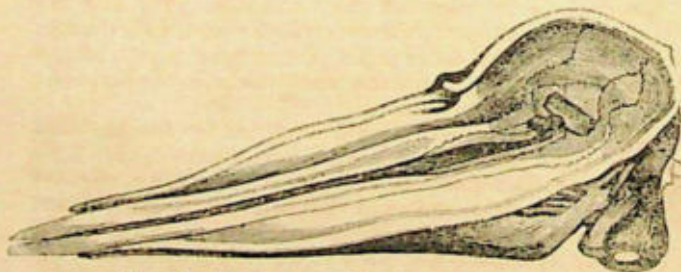
The food of the cachalot consists of seals, and fishes of a large size, which it pursues with great pertinacity; but it would appear that a large species of cuttle-fish (*Octopus*) forms its principal nutriment.

We have already noticed the magnitude of the head of the present species, and we may here observe that this magnitude is not owing to any extraordinary develop-

ment of the skull: the maxillary and intermaxillary bones are indeed prolonged, but the cranial portion is small, and rises abruptly (see Fig. 99, Skull of the Cachalot in profile). If, however, we look at the upper surface of the skull (Fig. 100), we find the top deeply concave, with a margin continued along the outer edge of each maxillary bone. It is in this concavity principally that the substance termed spermaceti, or more properly cetine, is lodged, and that in such immense quantity as to give to the head its extraordinary size and figure. This substance, in a semi-fluid state, is contained in a



99.—Skull of Spermaceti Whale, in profile.



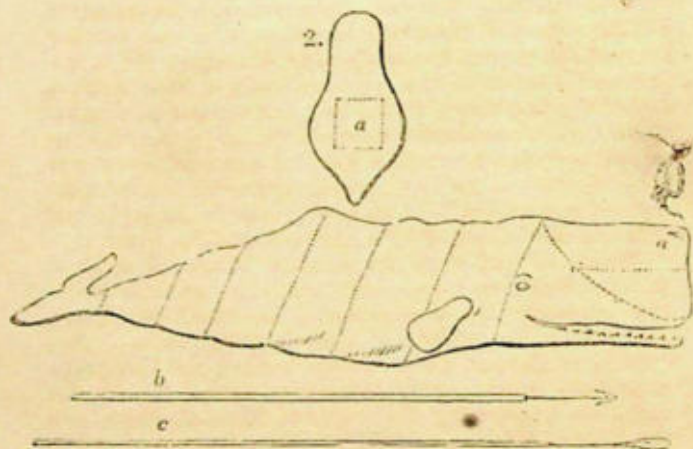
100.—Skull of Spermaceti Whale, seen from above.

tissue of cells, not only filling up the concavity of the surface of the skull, but giving to the head a singular elevation, the whole being invested by a dense cartilaginous expansion. Cetine is also found in cells along the back and in other parts of the body. This cetine exists mixed with oil, and, when the whale is killed, a hole is made in the outer and upper part of the head, and the oleaginous fluid is baled out with buckets. The first process is the separation of the oil by means of draining and squeezing; the impure cetine is then put into barrels in the state of a yellow unctuous mass, and is afterwards further purified by the following process:—“The mass is put into hair or woollen bags, and pressed, between plates of iron in a screw-press, until it becomes hard and brittle; it is then broken into small pieces and thrown into boiling water, where it melts, and the impurities are separated from it. After being cooled and taken from the first water, it is put into a boiler of clean water, and a weak solution of potash is gradually added. This is thrice repeated, after which the whole is poured into coolers, when the spermaceti concretes into a white semi-crystallized mass, and on being cut into small pieces exhibits a beautiful flaky appearance, so well known as belonging to the spermaceti of commerce.” An ordinary-sized whale will yield twelve large barrels of crude spermaceti.

Like other whales, the cachalot is clothed with a layer of blubber, but in less abundance than in the common whale (*Balæna mysticetus*). The oil procured from it, however, is thinner and more valuable. Fig. 101 represents in outline, 1, the spermaceti whale, with the sections marked for flencing; 2, the anterior aspect of the head; *a*, the place where the hole is made; *b*, the harpoon; *c*, the lance.

There is another substance produced by the cachalot, known in commerce under the name of ambergris. This substance, in the form of opaque grayish masses, marbled with darker tints, and somewhat hard and brittle, is found floating in many parts of the sea, or thrown up on the shore. It is most abundant in the neighbourhood of the Moluccas and along the coasts of China, Japan, Mada-

gascar, Africa, and also South America. Its consistence resembles that of common wax; it is fatty, inflammable, and when heated emits a fragrant but powerful musky odour. In general it is mixed up with the beaks of cuttlefish, the bones of fishes, and other foreign matters. For a long time the nature of this substance was utterly unknown. It has been regarded by some as a sort of bitumen, or as a kind of gum, and by others as a composition of wax and honey. It is now known to be produced, as a concretion, in the intestines of the cachalot, and is



101.—Spermaceti Whale.

often found in sickly or diseased animals; indeed, Dr. Schwediawer asserts that the existence of these indigestible concretions often occasions abdominal abscesses, after the bursting of which the ambergris is found floating on the surface of the sea. Formerly this substance was in high estimation as a medicine; at present it is only used as a perfume, but is seldom to be obtained unadulterated. As in most of the Cetacea, the skull of the cachalot is destitute of symmetry, having a turn as it

were, or bend, towards the left; it is asserted also that the left eye is smaller and more limited in visual range than the right, on which account the sailors endeavour to attack it on its left. Mr. Bennett makes no allusion to this circumstance, but merely observes that, if boats are not brought within the line of vision, the animal may be approached with great facility, the sense of hearing being very imperfect; "a deficiency, however, which appears to be in some measure compensated for by the perfection in which it possesses the sense of touch, through the medium of a smooth skin abundantly supplied with nervous papillæ. It even appears as though the cachalots had the means of conveying impressions to one another through the water, at considerable distances; for it is a fact well known to the southern whalers, that, upon a cachalot being struck from a boat, others that are miles distant will almost instantaneously display by their actions an apparent consciousness of what has occurred, and either make themselves off or come down to the aid of their injured companion." This intelligence he supposes can only be communicated by a concussion of the water.

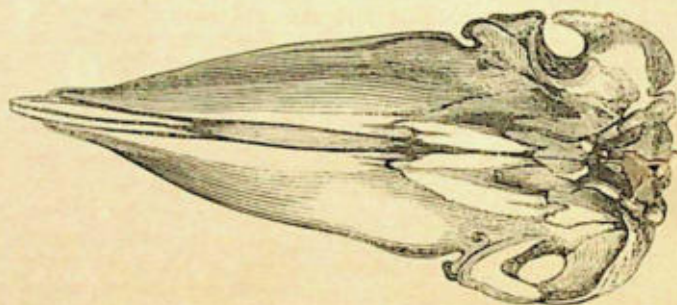
We have said that the cachalot roams all seas; it appears, however, to be more scarce in the arctic latitudes than formerly, but is abundant in the Southern Ocean, and within the regions of the antarctic circle. According to Colnett, the neighbourhood of the Galapagos constitutes a sort of rendezvous in spring for all the cachalots frequenting the coasts of Mexico, Peru, and the Gulf of Panama.

We have several instances on record of this animal having been captured on our own coast, and on that of the adjacent continent; it has been seen in the Mediterranean, off the Southern shores of Europe, as well as off the shores of Southern Africa, and in the channel of Mozambique.

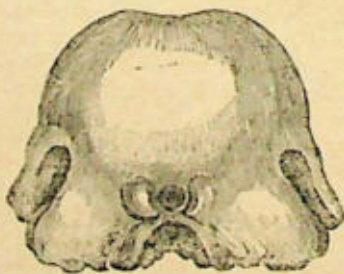
In 1769 a cachalot was killed in the Frith of Forth, and one was seen off the Kentish coast. In 1774 a large one was stranded on the coast of Norfolk; some few years since a small one was captured in the Thames near Gravesend. In 1784 thirty-two cachalots ran aground



102.—Lower Jaw of Spermaceti Whale.



103.—Skull of Spermaceti Whale, seen from below.



104.—Skull of Spermaceti Whale, back view.

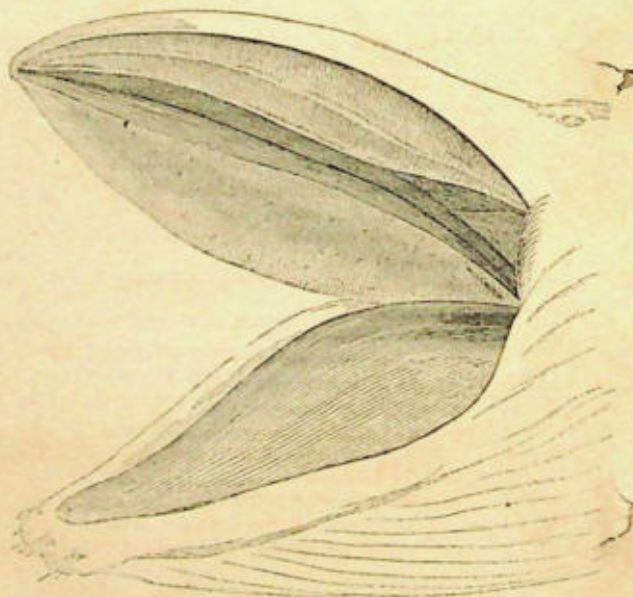
on the coast of Audierne, being stranded on the sands towards Cape Estain. In 1819 one of 63 feet in length was killed in Whitstable Bay. According to Lowe, the cachalot "is often driven ashore about the Orkneys, nay, sometimes caught."

The general colour of this species is grayish black above, lighter beneath; the eye is small, with a few stiff hairs around. There is no dorsal fin, but a distinct protuberance; the pectoral fins are small, and slightly grooved longitudinally. Fig. 102 represents a portion of the lower jaw, to show the teeth. Fig. 103, the skull seen from below. Fig. 104, the back view of the skull, showing its occipital elevation above the articulating processes and foramen magnum (see also Fig 99).

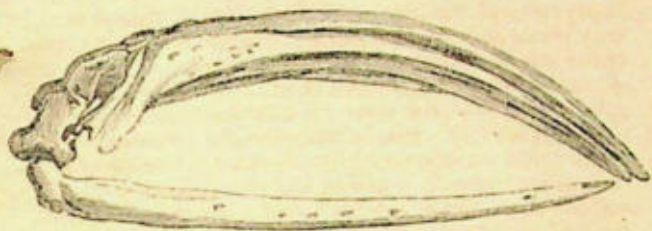
#### FAMILY—BALÆNIDÆ (THE TRUE WHALES).

THESE animals equal the cachalot in size, but have the head more proportionate to the bulk of the body, and display a less clumsy contour. They are, moreover, distinguished from all other Cetacea by the total absence of teeth; their place in the upper jaw, which is extremely narrow, being supplied by pendent horny laminae, called whalebone, or baleen. The palate of the whale is arched and oval (see Fig. 105), and forms a vaulted roof to which the plates of baleen are attached transversely, in two rows, parallel to each other. Each plate consists of a central coarse fibrous layer, lying between two which are compact and externally polished, constituting a sort of enamel or varnish; but which outer layers do not cover the internal or true baleen to its extreme free edge: the latter, therefore, extends beyond the former, and terminates in a fringe, in which are entangled the small molluscous animals which constitute the food of this huge animal. Each plate of baleen is of a subtriangular figure, and its base, attached to the palate, has a long furrow, fixed upon a pulp, buried deeply in the firm vascular substance of the gum covering the under surface of the maxillary and intermaxillary bones. The outer layers, of compact matter, are continuous with a white

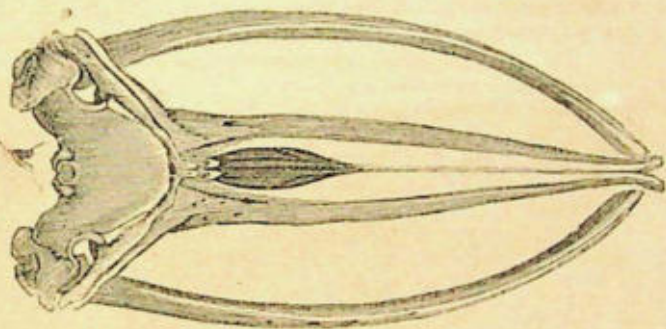
horny layer of the gum, which passes on to the surface of each plate, and the pulp is therefore the secreting organ of the internal layer of coarse elastic fibres. The number of plates composing each row is from 300 to 400, and, the palate being oval, the longest are those situated in medio; those towards the muzzle and near the entrance of the throat being consequently the shortest. The longest of these laminae often measure 15 feet and upwards in length; and the abbreviation anteriorly and posteriorly is gradual. Each plate, as we have said, is fringed, and the filaments of the fringe are very numerous, and fill up the cavity of the mouth sufficiently to form a strainer. The lower jaw is arched boldly outwards on each side, so as to form



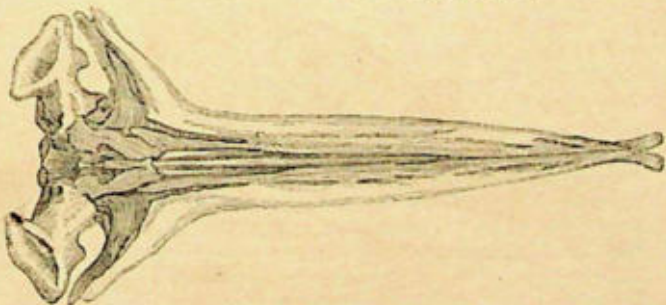
105.—Inside Jaws of Greenland Whale.



106.—Skull of Greenland Whale, in profile.



107.—Skull of Greenland Whale, upper view.



108.—Skull of Greenland Whale, under view ; lower jaw removed.

a broad ellipse, the margin of a huge spoon which ladles in and conveys to the strainer or fringes vast quantities of water replete with shoals of small crustacea, of the cho borealis, and other small tenants of the briny deep, which absolutely crowd its waters. The tongue is very large, thick, fleshy, fat, soft, and spongy. In the Greenland whale it often exceeds 20 feet in length, and nine or ten in width. The orifice of the gullet is very small; so that fish even of a moderate size cannot pass down. The eyes are small, and seated just above the angle of the enormous mouth. There are two distinct blow-holes on the top of the head. The skin is smooth and glossy. The blubber is abundant. In the Greenland whale the layer of this subcutaneous *lard* varies from eight or ten to 20 inches in depth, and a single whale of large size will yield about 40 tons;\* but much more has occasionally been obtained. The lips appear to be composed of little more than cellular tissue and blubber.

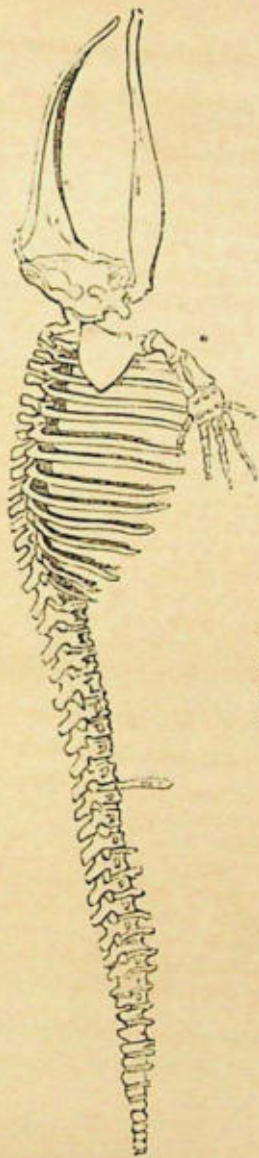
Referring to our pictorial specimens of osteology, Fig. 106 shows the skull of the Greenland whale in profile; Fig. 107, an upper view of the same; Fig. 108, an under view of the same, with the lower jaw removed; Fig. 108\* represents the skeleton of the Greenland whale, in which the rudiments of the pelvis are apparent.

### THE GREENLAND WHALE, OR GREAT MYSTICETE

(*Balana Mysticetus*).

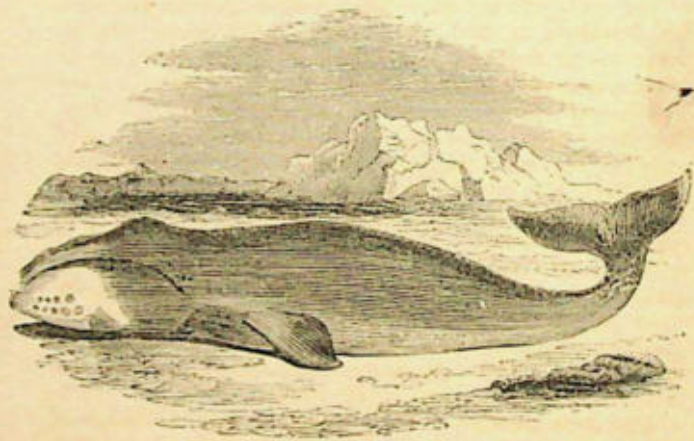
This colossal animal, yielding oil and whalebone, both valuable in a commercial point of view, is a native of the arctic seas, whither it is followed by a daring race of mariners amidst horrid icebergs and extensive floes, where danger in every form is imminent. Cold, intense beyond description,—this has to be borne; hunger, for often are the vessels ice-bound, and the provisions scanty,—this has to be endured; watchfulness, fatigue, and the chance of being engulfed during the tremendous conflict,

\* The proportion of pure oil to the blubber is as three to four.



108\*.—Skeleton of Greenland Whale.

—these the sailor bears and braves, content if he return home with a rich harvest gleaned from the arctic waters. The Greenland whale, therefore, even in this sense, is one of the most interesting of the Cetacea; nor is it less so from its habits and manners, which various observers, and in particular Captain Scoresby, have contributed to illustrate. The ordinary length of this species is from sixty to seventy or eighty feet; but it is said to attain occasionally to greater dimensions. Seen at a distance, it appears as a dark ill-defined mass floating on the surface of the water, and indeed it is only when lying on its side, after death, that its true outline is to be made out. (Fig. 109.)



109.—Greenland Whale.

It is upon minute animals, such as small shrimp-like crustacea, the *clio borealis*, medusæ, &c., that this huge animal supports his colossal frame. Ploughing his way beneath the surface with open mouth, he engulfs his prey by myriads, which become entangled among the filaments fringing the baleen, and thus are as it were sifted from the water, which escapes at the sides. Every

few minutes he rises to breathe, expelling through the blow-holes a column of steam and water, and again plunges to continue his repast. In order to dive, the whale first raises his head, and then plunges it under the surface, drawing his tail at the same time underneath the body so as to form the segment of a circle; instantaneously he strikes it out, and goes down like a shot. The length of time passed beneath the surface varies, but according to Captain Scoresby it seldom exceeds half an hour, and this only when harpooned; under such circumstances, on appearing again, which is generally at a considerable distance from the spot where the animal descended, he is always in a state of great exhaustion, owing chiefly to the immense pressure he has sustained, but no doubt in part to the long suspension of respiration: under ordinary circumstances the whale rises to breathe every eight or ten minutes.

The velocity of the whale is very great. Captain Scoresby harpooned one which, on being struck, descended four hundred fathoms, at the rate of eight miles an hour. But under the pain of this weapon they often descend a much greater depth, subjecting themselves to an enormous pressure of water, and are at the same time so overcome by terror as often to bruise themselves severely by the rocks met with in their course, and sometimes even to strike so violently against the hard bed of the ocean as to fracture their jaws. At the depth of 800 fathoms Captain Scoresby calculates the pressure at 211,200 tons.

The most pleasing as well as astonishing exhibition of the power and activity of these animals is during the pairing season, when they gambol and frolic in the waters, throwing themselves about in the exuberance of delight, little aware of the approach of their enemies. Sometimes they dart along the surface, and then dive and re-ascend with such energy as to leap entirely out of the water; sometimes they raise themselves perpendicularly; sometimes, head downwards, they flourish their tails aloft, and lash the water with tremendous violence, throwing the sea around them into foam, and

producing a roaring noise resounding to a considerable distance. The tail is, in fact, not only their organ of locomotion, but their weapon of defence, and, though extremely timid and peaceful, they often use it, when driven to despair, with terrible effect; and this the more particularly when one of a pair is struck, or the life of the cub is in danger. The mutual attachment of each pair, and the affection of the female for her young one, are intense; and many are the instances on record in which the one has died in defending the other. Captain Anderson relates that, "having struck one of two whales, a male and female, that were in company together, the wounded one made a long and terrible resistance; it struck down a boat with five men in it by a single blow of the tail, and all went to the bottom; the other still attended its companion, and lent it every assistance, until at last the whale that had been struck sank under its wounds, while its faithful associate, disdainful to survive the loss, stretched itself upon the dead animal, sharing its fate." A more affecting instance, exemplifying the strength of maternal attachment, is related by Captain Scoresby. One of his harpooners struck a cub in the hope of capturing the mother (a plan, we are sorry to say, frequently made use of), who arose, and, seizing the young one with her paddle, dived instantly, dragging about a hundred fathoms of line out of the boat with considerable velocity. Again she arose to the surface, furiously darted to and fro; frequently stopping short, or suddenly changing her direction, and exhibiting every symptom of extreme agony. For a considerable length of time she thus continued to act, although closely pursued by the boats, but her concern for her offspring made her regardless of the danger by which she was surrounded. After two fruitless trials she was harpooned, but even then did not attempt to escape, notwithstanding her sufferings, but still clung to her offspring, and allowed the other boats to approach, so that in a few minutes three more harpoons were fastened, and in the course of an hour both the mother and cub were floating dead.

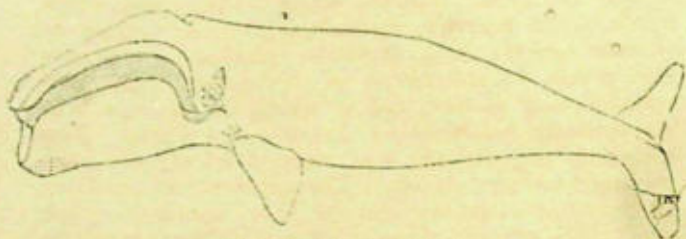
The female of this species produces only one cub at a birth, which remains under her care for a considerable period, until, by the development of the baleen plates, it is enabled to procure its own support. The whale usually lives in pairs, but sometimes numbers are seen together, in places to which abundance of food or other causes induce them to resort.

The unceasing persecution to which the Greenland whale has been long subjected has not only thinned its numbers, but driven it from localities in which it was formerly common. It is at present chiefly to be found in the icy seas of Spitzbergen, in Davis's Straits, Baffin's Bay, and the waters of the polar circle. General colour above, a velvety blackish gray; under parts, white.

An allied species, the Cape or Southern Whale (*Balæna Australis*, Cuv.), but not attaining to so large a size, inhabits the Southern Ocean, and in the month of June visits the bays of Africa adjacent to the Cape of Good Hope, for the purpose of bringing forth its young. It is, in fact, only the females that thus approach the coast, and they return to the main ocean in September. Two skeletons, brought by De Lalande in 1820, are in the museum of Paris, and the osteological differences between this and the Greenland whale have been described by Cuvier. The speculations of commerce have been directed to this representative of the northern mysticete, which at a future day may in like manner become driven from its old haunts to more remote abodes.

Fig. 110 is the outline of a species of *Balæna* (*Balæna Antipodarum*), tenanted the ocean near New Zealand. Of the mode of attacking the Greenland whale, and as conveying some idea of the dangers of the contest, we relate the following incident:—"Captain Lyons, of the Raith of Leith, while prosecuting the whale fishery on the Labrador coast, in the season of 1802, discovered a large whale at a short distance from the ship. Four boats were sent in pursuit, and two of them succeeded in approaching it so closely together, that two harpoons were struck at the same moment. The whale descended a few fathoms in the direction of another of the boats,

which was on the advance, rose accidentally beneath it, struck it with its head, and threw the boat, men, and apparatus about fifteen feet into the air. It was inverted by the stroke, and fell into the water with its keel upwards. All the people were picked up alive by the fourth boat, excepting one man, who, having got entangled in the boat, fell beneath it, and was unfortunately drowned."



110.—New Zealand Whale.

### THE RORQUAL

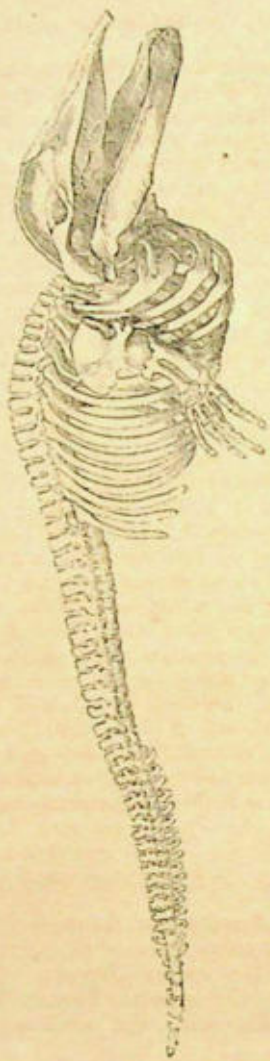
(*Balænoptera Boops*, Flem.; *Balænoptera Rorqual*, Lacép.).

The Rorquals, constituting the genus *Balænoptera*, differ from the Greenland whale and its allies in the possession of a small dorsal fin on the lower part of the back (not seen in the position of the pictorial specimen), and a series of longitudinal folds on the skin of the under surface of the body, and particularly the throat and chest. The plates of baleen are short. The food of these animals consists of fishes, and especially herrings and other species which go in shoals, and they engulf multitudes at once in the abyss of their capacious mouth. They are remarkable for the rapidity and ease of their movements: they dart along or dive with almost unequalled impetuosity, and are dangerous to attack. From this cause, as well as from the small quantity of blubber they afford, and the inferior quality of the ba-

leen, they are seldom chased by the crews of the whaling-vessels. The species do not seem to be as yet well determined.

The Great Rorqual is one of the largest, if not the largest, of this gigantic race of beings, often exceeding a hundred feet in length. Its native regions are the polar seas, where it is seen both in troops and pairs, the paired males and females exhibiting devoted attachment to each other. The rorqual is more restless, more suspicious, and fiercer than the common whale, and, when struck by the harpoon, descends with such velocity as often to snap the line. It was an individual of this species which, in the month of November, 1827, was stranded near Ostend, and of which the skeleton was subsequently exhibited in London and Paris. The length of the skeleton was ninety-five feet; the head measured twenty-two feet. The spinal column consisted of sixty-two vertebræ; the ribs were fourteen on each side. The expanse of the caudal paddle was twenty-two feet and a half. The opportunity of examining the internal anatomy of this animal was lost, a circumstance lamented in indignant but just terms by M. Van Breda, whose memoir on the subject is published in Cuvier's 'Histoire Naturelle des Cétacées.' This writer states that, besides the usual plates of baleen, the animal had at the tip of its muzzle a thick tuft of rounded horny filaments, or rather coarse hairs, united at the root by a common membrane, and divided into finer threads at their points; these filaments were of different length, some exceeding three feet. This peculiarity had not, we believe, been previously noticed. The weight of this individual when captured was 480,000 pounds, and 4000 gallons of oil were extracted from the blubber. Weight of the skeleton alone, 70,000 pounds. Fig. 111 represents the skeleton.

Here we close our survey of the Cetacea. It is a class which yet requires much elucidation; its species are still involved in confusion, and of many almost everything is yet to be learned. They have seldom indeed been contemplated in their native regions by pro-



111.— Skeleton of Horn, nat.

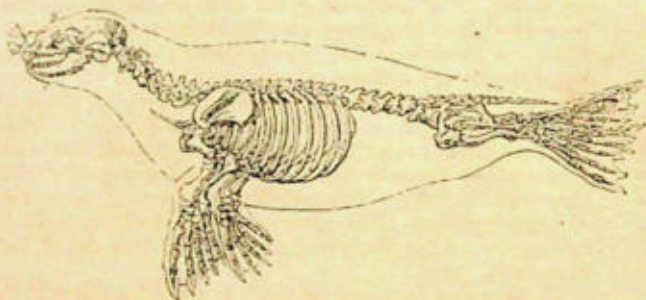
fessed naturalists—hence the changes they may (many of them, at least) undergo in their progress from youth to maturity, the duration of their lives, the rapidity of their growth, and many points in their economy are yet desiderata. Who has counted the years of the whale; who has marked an individual from birth, till, one of the patriarchs of its oceanic race, it has failed beneath the burden of ages? Who has tracked these colossal beings, in their migrations, or patiently studied their nicer instincts, their less prominent manners and habits?—Their ways are hidden in the deep, and the little that we know of them is the result of accumulated but fortuitous observation, to which commerce has impelled a daring class of men, whose great object is their destruction. Much information will be doubtless added from time to time, but, after all, many points will necessarily remain beyond our powers of acquisition.

¶ We may conclude by observing that the chase of the whale was carried on by the Norwegians as early as the ninth century, principally, as it would appear, for the sake of its flesh, which was accounted a delicacy. Formerly a species of whale abounded in the Bay of Biscay, and was killed by the inhabitants of the coast for the same object, till at length it was driven away from that bay by incessant persecution; the Biscayan mariners then carried the navigation farther and farther from their own shores, till at last they approached the coasts of Iceland, Greenland, and Newfoundland; and thus was commenced, in the course of the sixteenth century, the northern whale fishery as pursued in modern times; the object being not the flesh of the animal, but the blubber and baleen.

#### FAMILY—PHOCIDÆ (SEALS).

Of all four-limbed mammalia the seals (Phocidæ) are those which most display in every part of their organization a fitness for the watery element. The body is elongated and conical, tapering from the chest to the tail (see skeleton, Fig. 112), the pelvis being so narrow

as not to interrupt the gradual decrease. The spine is provided with muscles capable of inflecting it with considerable force. The clothing consists of short, stiff glossy hairs, very closely set, and adpressed against the skin. The limbs are oars or paddles. The anterior pair have the humerus and fore arm so short, that little more than the paw alone advances from the body; this in reality consists of five fingers, but they are impacted in skin, the nails, which are flat, indicating their number. The hinder limbs are directed backwards, and terminate the body; the bones are short and strong, and the hip-joints want the ligamentum teres. The feet are broad-



112.—Skeleton of Seal.

webbed paddles, consisting of five toes, the central of which is the shortest, the outer one on each side the longest; when not in action the webs of these paddles are folded, and the toes in contact, but when brought into use they spread and present a broad surface. Between these paddles is the short and compressed tail. On land or masses of ice these animals are very awkward and clumsy, but they scuttle along by the action of the anterior paddles, dragging their hinder quarters after them, and manage to proceed with tolerable rapidity; they can also climb rocks and crags of ice.

The neck in these aquatic animals is very long and

singularly flexible; the head is round, with a large full fleshy muzzle, furnished with long stiff whiskers; the nostrils are valvular, and capable of being closed at will; the eyes are large and dark, with a mild intelligent expression, and are adapted for subaquatic vision. The external ears are either wanting or very small, and the auditory orifice is valvular; the tongue is almost smooth, and is abrupt and indented at its tip; the brain is large, the lungs voluminous, the stomach capacious.

The internal arrangement of the venous system is very remarkable, and adapted so as to effect a sort of reservoir for the blood, which naturally accumulates in it when the circulation is impeded during the suspension of breathing, as is perpetually the case as the animals are pursuing their prey beneath the surface of the water. Between the skin, which is very tough, and the muscles, there intervenes a fibrous loose elastic tissue of a dark red tint; indeed the muscles are dark, and the blood of a blacker hue than in most mammalia. From the anterior part of the breastbone (sternum) a long cartilaginous continuation projects forwards for the more extensive attachment of the voluminous muscles acting upon the anterior paddles. The arteries of the limbs are plexiform, as we have described them in the volume of the **MONKEYS**.

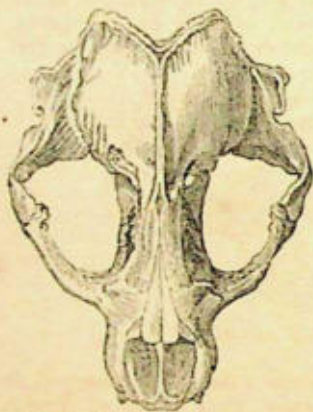
The varying forms of the skull in the Phocidæ will be easily appreciated by reference to our pictorial specimens. With respect to the teeth, we may describe them as prehensile; they are not formed for grinding, but for seizing the slippery prey and dividing its flesh into large portions. Their number is very different in the different species, nor less so are the minor details of their structure. The incisors are six or four above, and four or two below; the canines are large and strong; the molars are either simply conical or furnished with cutting edges, and more or less deeply notched with a large central point. Without entering into any disquisition respecting the genera into which the seals are divided, and their arrangement—a point of the less importance, as our knowledge of the group is at present confessedly imper-

fect—we shall proceed at once to comment upon the specimens before us.

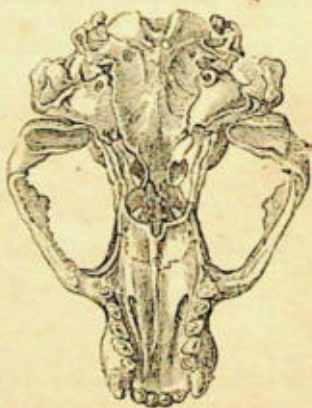
THE COMMON SEAL (*Phoca vitulina*);

*Calocephalus vitulinus*, F. Cuv.

Le Veau marin and Phoque commun of the French; Vecchio marino of the Italians; Lobo marino of the Spanish; Meerwolf and Meerhund of the Germans; Zeehund of the Dutch; Seelund of the Danes; Sial of the Swedes; and Moelrhon of the ancient British.



113.—Skull of Seal, upper view.



114.—Skull of Seal, lower view.

For the general characters of the skull in the genus *Phoca*, or *Calocephalus* of F. Cuvier, reference may be made to Fig. 113, an upper view; Fig. 114, an under view; and Fig. 115, a profile of the *Phoca Monachus*.

Fig. 116 illustrates the dentition. Molars,  $\frac{5-5}{5-5}$ .

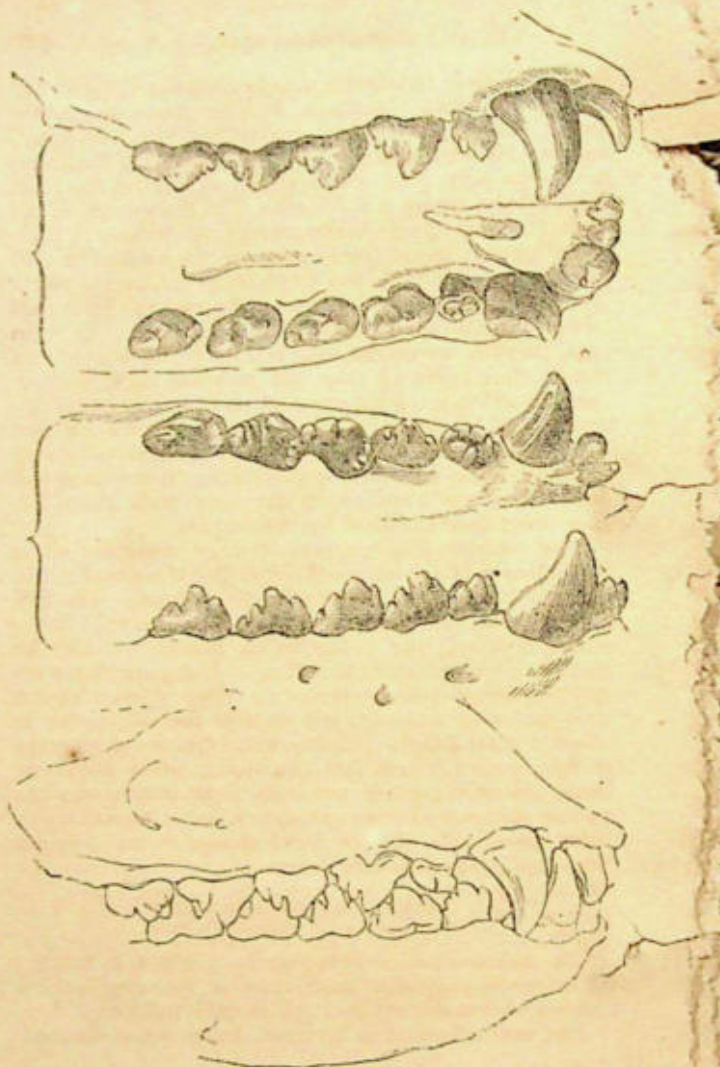
The *Phoca vitulina* of Linnæus has only within the last few years been disengaged from confusion; three

distinct species, according to Nilsson, having been included under that denomination, viz. *Ph. variegata*, *Ph. annellata*, and *Ph. leporina*. To the first of these the term *vitulina* is really applicable, and the term *variegata*, given by Nilsson, must be abandoned. The common seal is found along the shores of temperate Europe, and is common on many parts of the Scottish coast, and also of those of England and Ireland. It is gregarious in its habits, and haunts caverns and recesses among the rocks, to which the females retire to breed. The young are generally two in number, and the mother nurses them with great assiduity and affection, taking them out to sea very early. When surprised basking on the shore, which the seal often does, luxuriating in the sun, its first



115.—Skull of Seal.

effort is to make for the water; but, if intercepted, it shows fight, and with a growl turns on its adversary, who, unless he avoid the attack, is in some danger, for the animal has great power and weight (often two hundred and twenty-four pounds): having overset its antagonist, it shuffles to the water, and there disappears. All are familiar with Sir Walter Scott's humorous narrative of Hector MacIntyre's discomfiture by a "phoca." ('The Antiquary.') The voice of the seal is a gruff grunt, not unlike that of a pig, but when wounded it often utters a peculiar moaning sound. These animals are sagacious and watchful, and while half-slumbering on the beach their customary caution seldom leaves them,



116.—Teeth of Seal

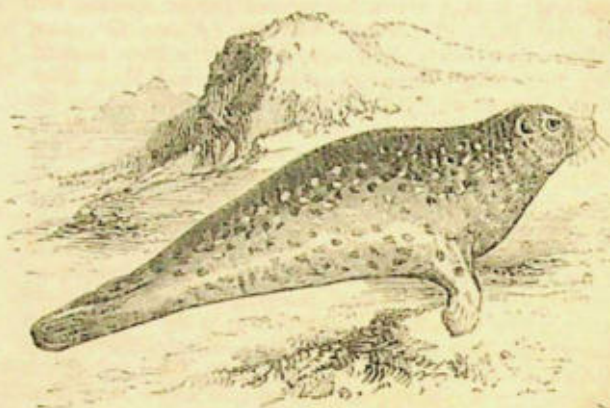
for one of their number is usually placed a little higher on the rock than the others, and he seems constantly awake, and ever and anon upraises his "grim feature," scenting the windward air. Flatfish, especially flounders, are the favourite food of this species, at least off the coast of Colonsay, where it is common. In the estuary of the Tees it makes great havoc among the salmon. This seal is hunted, as are others also, for the sake of its skin and blubber. The fishing commences in autumn, and is practised by means of nets stretched across narrow sounds where the seals are in the habit of swimming. In these nets they are entangled, but it is only the young that can be thus captured; the old ones are shot, or their recesses and caves are entered at night by boatmen with torches and bludgeons, upon which the animals, alarmed by the glare and the shouts of the men, rush tumultuously forward to sea, and, as they push along in confusion and terror, they are knocked on the head with clubs, the men being duly stationed for the purpose.

The common seal can remain under water for about five minutes, and swims so rapidly, that if alarmed it will proceed nearly half a mile during that period. The seal is intelligent and docile, and easily domesticated: it becomes attached like a dog to its master, and may be readily taught to assist in fishing. Many anecdotes respecting tamed seals are recorded. Few animals have a finer sense of hearing, and musical sounds appear to afford it great delight. Laing, in his account of a voyage to Spitzbergen, states that the violin, when played on board the vessel, would generally draw around it a numerous audience of seals, which would continue to follow it for miles. Sir Walter Scott alludes to the same curious fact in the following lines:—

"Rude Heiskar's seals through surges dark  
Will long pursue the minstrel's bark."

The common seal is from four to five feet in length; its colour is yellowish gray, more or less dappled and spotted with dusky brown. (Figs. 117 and 118.)

The seal is hunted in Scotland, but it is not the com-



117.—Common Seal.



118.—Common Seal.

mon seal; it is a much larger and fiercer species, viz. the gray seal, *Halichærus Gryphus* (*Phoca Gryphus*, Fabricius), which is also common round the Farn Islands. (See Mr. Selby's observations in 'Ann. and Mag. Hist. Nat.,' February, 1841, p. 462.) This species has till lately been confounded with another, viz. the *Phoca barbata*, which is rarely if ever seen on our coasts.

The gray seal is of great size, sometimes attaining the length of twelve feet, and producing upwards of twenty gallons of oil. It swims and dives with wonderful rapidity, but from its curiosity often comes within range of the rifle, for, as the boats approach it while reposing on the rocks or swimming on the water, it raises its head and remains for many minutes gazing at the objects of its attention. The gray seal has but little intelligence, and cannot be tamed. The young, which are produced in August, grow rapidly, and are able to follow their dams to the water within a fortnight after birth.

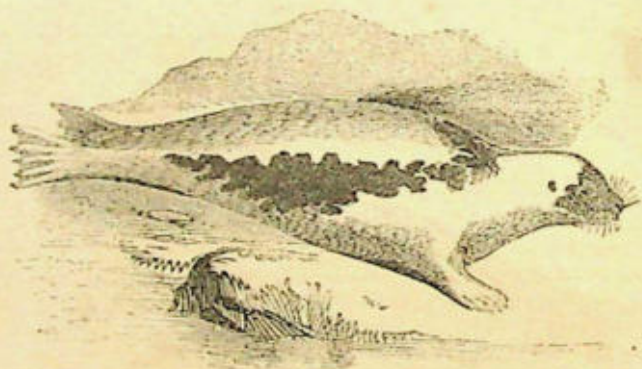
Mr. Newman, in his interesting 'Notes on Irish Natural History' ('Mag. Nat. Hist.,' December, 1839, p. 575), observes that "these seals are most abundant all round the coast of Cunnemara, from Galway to the Killyeries; indeed, I imagine, on every part of the coast of Ireland: they are strong, resolute, and ferocious animals, and totally different from the *Phoca vitulina*, which is in these respects the reverse. The *Halichærus Gryphus* grows occasionally to an enormous size, sometimes attaining even the length of twelve feet, and Mr. Ball, of Dublin, told me of one he had killed at Howth Harbour, which he believed to weigh five hundred pounds. *Phoca vitulina* occurs not unfrequently on the north coast of Ireland, and among the Scotch islands, but it appears to be nearly expelled from the southern half of Ireland by the more powerful and savage species above referred to." Mr. Selby records one killed in the Farn islands, weighing upwards of forty-seven stone, fourteen pounds to the stone.

The gray seal is stated by Nilsson to be solitary in the Baltic; but such is not the case either on the Farn islands or the coast of Ireland, where it tenants caves

and rocks, in parties of twelve or fourteen, or perhaps more. No doubt, like the common seal, it is often seen alone.

### THE HARP-SEAL (*Phoca Grælandica*).

The native regions of this seal are the shores of Greenland, Newfoundland, Iceland, Kamtchatka, &c. It is one of the species in the chase of which the Greenlander encounters so many perils. Crantz, in his History of Greenland, states that it is there called Attarsoak. "It has a pointed head and big body, and is, when full-grown, nearly three yards long; it is then almost all of a white-gray colour, and has a black figure on its back like two half-moons, with their horns in a uniform direction towards one another. But there are others somewhat

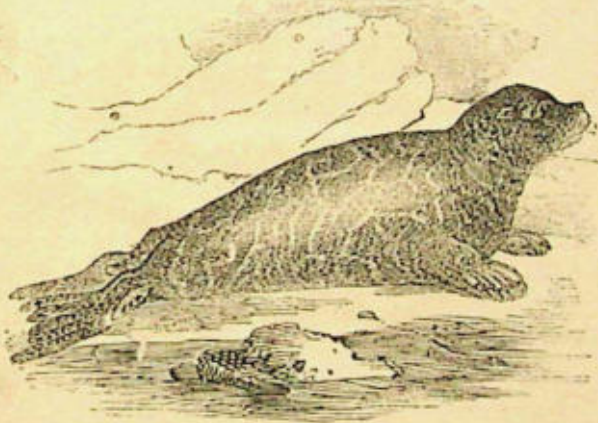


119.—Harp-Seal.

blackish all over. (Fig. 119.) All seals vary annually in colour till they are full grown, but no sort so much as this; and the Greenlanders vary its name according to its age. In the first year it is called Attarak, and is of a cream colour: in the second year, Atteisiak; it is then gray: in the third year, Aglektok; it is then painted: in the fourth year it is Milektok; spotted: in the fifth

year, Attarsoak; it then wears its half-moon, the signal of maturity."

It is singular that the Greenland seal, in its immature livery, occasionally visits the British shores, and also the coasts of France. In the 'Proceedings of the British Institution' for 1836 there is an account of two caught in the Severn; one captured on the coast of France lived for some time in the Jardin des Plantes at Paris. Fred. Cuvier, considering it a new species, gave it the title of *Calocephalus (Phoca) discolor*. Professor Nilsson also regarded the immature as a distinct species, and characterized it as such under the name of *Phoca annellata*. The titles, therefore, *discolor* and *annellata*, must both merge into *Grænlandica*.



120.—Immature Harp-Seal.

Fig. 120 is the immature Harp-Seal, the *Phoca discolor* of F. Cuvier, from a specimen which was captured on the coast of France, and lived for several weeks in the Paris Menagerie. M. F. Cuvier declares that he never knew any wild animal that was more easily tamed

or attached itself more strongly. When it first came to the Jardin des Plantes, it did its best to escape when M. F. Cuvier tried to touch it; but in a very few days its timidity vanished, and it rather courted his caresses than shunned them. In the same enclosure with it were two little dogs, and they amused themselves by mounting on the seal's back, barking, and even biting it: the seal, however, took it in good part, and seemed pleased with them, though it would sometimes give them slight blows with its paws, as if more to encourage their play than repress their liberties. When the little dogs made their way out of the enclosure, the seal tried to follow them, not deterred by the rough and stony ground. In cold weather they all three huddled kindly and warmly together. If the dogs snatched the fish from the seal's mouth when he was feeding, he bore it patiently; but he exhibited very different conduct to another seal, who shared his mess; for they generally had a fight over their meal, the combat ending, as usual, in the defeat of the weakest.

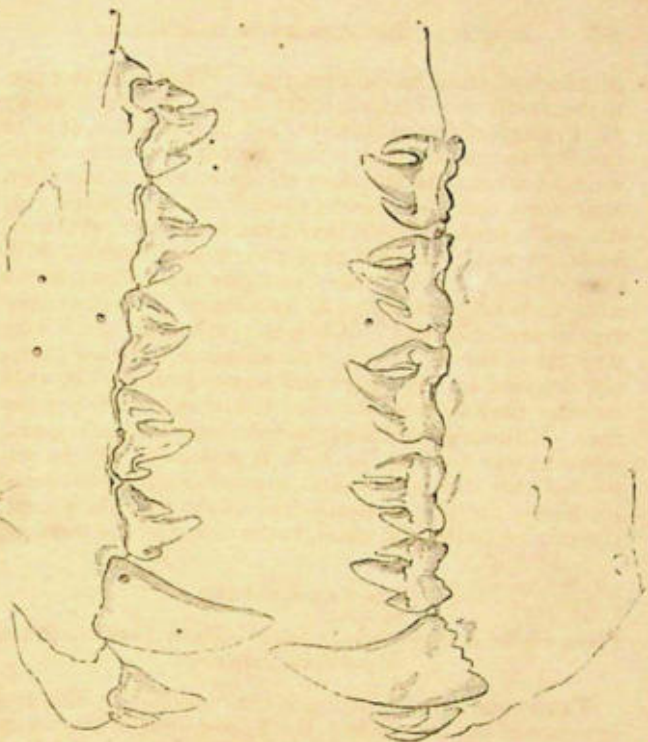
#### THE SEA-LEOPARD

(*Stenorhynchus leopardinus*): *St. Weddellii* Lesson; *Phoca leopardina*, Jamieson.

The genus *Stenorhynchus* is characterized by the prominence of the muzzle and the jagged form of the teeth, which have each a bold acute middle tubercle, and an anterior and posterior acute tubercle of smaller size, separated from the middle one by a deep notch. Claws very small.

Dental formula:—Incisors,  $\frac{4}{4}$ ; canines,  $\frac{1-1}{1-1}$ ; molars,  $\frac{5-5}{5-5} = 32$ . (See Fig. 121.) Fig. 122 represents the skull of a species of *Stenorhynchus*.

Of the habits of the sea-leopard little is ascertained. It inhabits the South Shetlands (south of Terra del Fuego), in  $60^{\circ} 37' S.$  lat., and attains to the length of eleven feet. The hair is soft and thin, grayish above,



121.—Teeth of Sea-Leopard.



122.—Skull of Sea-Leopard

yellowish on the under parts: the whole of the upper surface is spotted with whitish. The claws are sharp, black, curved, and grooved. (Fig. 123.)

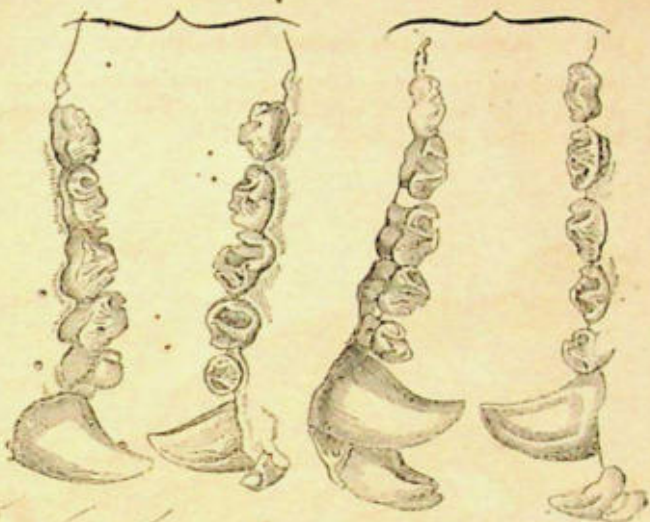


123.—Sea-Leopard.

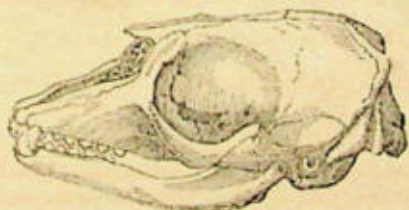
#### THE CRESTED SEAL (*Stenomatopoda cristatus*).

In the genus *Stenomatopoda* the head is surmounted by a curious hood-like appendage, the nature of which is not well understood. Molars with simple roots, short, wide, and striated only on the crown; muzzle narrow and obtuse. Dentition:—Incisors,  $\frac{4}{2}$ ; canines,  $\frac{1-1}{1-1}$ ; molars,  $\frac{5-5}{5-5} = 30$ . (See Fig. 124.) Fig. 125 represents the skull.

The crested seal is a native of Greenland and various parts of the coast of North America. Crantz says it is called Neitsersoak by the Greenlanders, and also Clap-

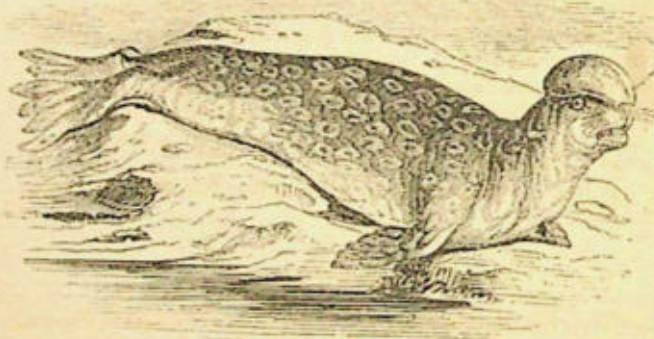


124.—Teeth of Crested Seal.



125.—Skull of Crested Seal.

mutz, from the "thick folded skin on its forehead, which it can draw down over its eyes like a cap to defend them against the storms, waves, stones, and sand." The apparatus consists of a cartilaginous crest which arises from the muzzle and increases rapidly in height as it passes backwards, being about seven inches high at its posterior edge, which is separated into two planes by an intervening depression an inch deep; this cartilaginous appendage is a development of the septum of the nose, and it runs into the hood or sac-like appendage of the



126.—Crested Seal.

head, which is strongly muscular, with circular fibres round its two orifices at the snout like nostrils, the true nostrils opening on each side of the cartilaginous crest beneath the hood, and are of an oblong figure. In the females and young the curious apparatus is undeveloped, being peculiar to the adult male. The eyes, which are capable of being drawn deeply into the socket during repose, are eminently formed for discerning distant objects. The fur is soft, long, and woolly beneath; in old indi-

viduals it is black, silvered on the under parts. In young animals it is gray, spotted irregularly with brown. The dilatable sac which crowns the head is covered with short brown hair. (Fig. 126.)

The crested seal attains to the length of eight feet. It haunts the open sea, and is said to visit the land chiefly in April, May, and June. These animals are commonly seen on large ice-islands, where they sleep without precaution. Great numbers are found in Davis's Straits, where they are stated to make two voyages a-year—in September and March. They depart to bring forth their young, and return in June very lean and exhausted. In July they proceed again to the north, where they appear to procure plenty of food, for they return in high condition in September. One male is lord of many females. They fight among themselves very desperately, inflicting deep wounds with the claws and teeth. Their bite is indeed very formidable. The voice of this seal is stated to resemble the bark and whine of a dog. Great numbers of the skins of this animal are brought to England, and it is one of those seals which are so valuable to the Greenlanders.

It is the *Phoca cristata* of Gmelin, the *Phoca leonina* of Fabricius.

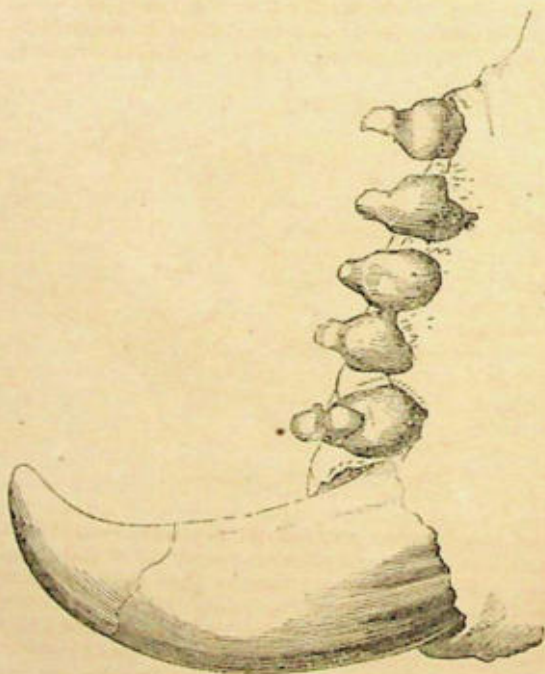
### THE ELEPHANT-SEAL

(*Macrorhinus proboscideus*); Bottle-nose of Pennant; Phoque à trompe of Péron; Mioproung of the Australians.

In the genus *Macrorhinus* the males have the power of lengthening their large moveable snout into a proboscis resembling that of the tapir, through which, when excited, they respire violently. The teeth consist of four incisors above and two below, formed like the canines: the canines themselves are very large, conical, and recurved; the molars are  $\frac{5-5}{5-5}$ , with simple roots far exceeding in circumference the crowns, which are mere mamillary projections (see Fig. 127).

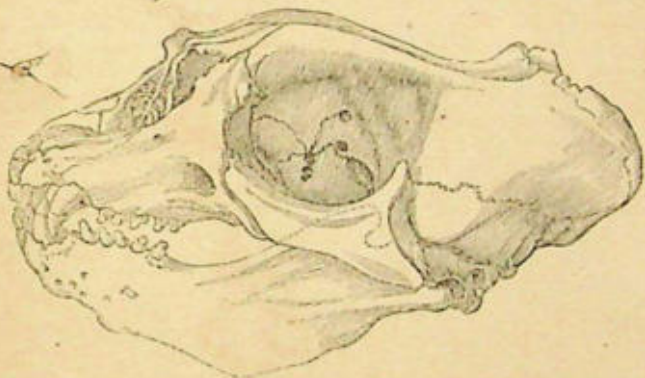
Fig. 128 represents the skull of *Macrorhinus*.

The whiskers are strong, coarse, long, and screw-twisted; the eyes are large and prominent; the paddles well developed, the nails small; hair short and close; its colour grayish or bluish gray, rarely blackish brown. Length from twenty to thirty feet, girth from fifteen to eighteen feet. In the female there is no proboscis; the colour is dark olive-brown above, passing into yellowish bay on the under parts. The hair lies in patches in all directions, giving a spotted appearance to the body somewhat like watered silk. No nails on the hind toes.



127.—Teeth of Elephant-Seal.

The elephant-seal is a native of the southern hemisphere, in the Atlantic, Pacific, and Southern Oceans, between  $35^{\circ}$  and  $55^{\circ}$  S. lat., Kerguelen's Land, South Georgia, Juan Fernandez, South Shetlands, and the Falklands. This huge seal lives in troops, which at certain seasons frequent various islands in the southern seas, especially where fresh-water lakes or swamps, in which they delight to wallow, are easily accessible. They are in fact migratory animals, advancing with the winter season towards the tropic of Capricorn, and towards the south in the summer. It is in the middle of June that they perform their first migration, covering, in countless multitudes, the shores of King Island, which, as the sailors report, are sometimes blackened by them.



128.—Skull of Elephant-Seal.

Here the females produce their young, and, as it is affirmed, the males form a line between the females and the sea, while the latter are nursing their cubs, in order to prevent the possibility of their deserting their charge, even for the shortest space of time. (Figs. 129 and 130.) The period of nursing and imprisonment lasts for seven or eight weeks, during which time the females are de-



129.—Elephant-Seals. Males.

barred from food, and become extremely emaciated: some, it is said, occasionally perish. The growth of the young is very rapid. After birth they measure between four and five feet, but in eight days are double their original dimensions, and in the third year are from eighteen to twenty-five feet in length. At this period the proboscis begins to be developed in the male. When the term of imprisonment has expired, the whole troop, young and all, visit the sea, where the females soon recover their strength and condition, and where they sojourn for about a month, when they again visit the shore, which now becomes the arena of most furious conflicts between the adult males, the females remaining passive spectators. When these scenes of bloodshed and excitement have ended, the troop, under the guidance of a leader, leave the shores of the islands in lat. 33°, and migrate southwards towards the antarctic circle, where they spend the summer months. It is observed, however, that a few remain in the former localities, even during the summer, probably in consequence of being disabled by

wounds or debility from undertaking the ordinary journey. As soon as the frost commences in the low southern latitudes, the herds begin their return towards the tropic, and in June have arrived at their accustomed breeding-places.



139.—Elephant-Seal. Female.

Captain Carmichael, in his description of the island of Tristan d'Acunha (see 'Linn. Trans.,' vol. xii.), observes that a full-grown male will yield seventy gallons of oil; indeed, as they crawl along, their body trembles like a great bag of jelly. "These seals pass the greater part of their time on shore: they may be seen in hundreds lying asleep along the sandy beach, or among the long grass which borders the seashore. These huge animals are so little apprehensive of danger, that they must be kicked or pelted with stones before they make any effort to move out of one's way. When roused from their slumber, they raise the fore part of their body, open

wide their mouth, and display a formidable set of tusks, but never attempt to bite. Should this, however, fail to intimidate their disturbers, they set themselves at length in motion, and make for the water, but with such deliberation, that, on an excursion we once made to the opposite side of the island, two of our party were tempted to get upon the back of one of them and rode him fairly into the water." These animals taken young are easily tamed, and become very affectionate; one petted by an English seaman became so attached to his master from kind treatment for a few months, that it would come at his call, allow him to mount upon its back and put his hands into its mouth.

The voice of the male is deep, hoarse, and terrific, and may be heard at a great distance; that of the females and young is a kind of loud bellowing.

The food of the elephant-seal appears in great part to consist of cuttle-fish and seaweed, the beaks of the former and remains of the latter, often mixed with pebbles, being commonly found in the stomach.

It is for the oil of this species principally, which, besides being yielded in great abundance, is clear and inodorous, that the seal-fisheries of the South Pacific are conducted. The skin, moreover, is valuable, from its strength and thickness, and is extensively used for carriage and horse harness. The flesh is oily and disgusting, but the tongues, when salted, are said to be very excellent.

#### THE URSINE SEAL

(*Arctocephalus ursinus*); *Phoca ursina*, Linn.; *Ursus marinus*, Steller; *L'Ours marin* of Buffon.

The characters of the genus *Arctocephalus* are as follows:—Head with a narrow retracted muzzle: the dentition thus: Incisors,  $\frac{6}{4}$ ; canines,  $\frac{1-1}{1-1}$ ; molars,  $\frac{6-6}{5-5}$  = 36 (see Fig. 131); small external ears. Fig 132 represents the skull of *Arctocephalus*.

The ursine seal attains the length of nearly eight feet;



191.—Teeth of Ursine Seal.

its fur is brown, washed with gray: it is long and erect, especially round the neck in old males, where the hair is two inches in length and stiff; there is beneath the hair a soft brownish-red wool close to the skin. (Fig. 133.) This species inhabits the islands on the north-west of America, Kamtchatka, the Kurile Islands, &c., and is migratory in its habits. When these seals appear off Kamtchatka and the Kuriles early in the spring, they are in high condition, and the females are pregnant. They remain on or about the shore for two months, during which the females bring forth. They are poly-



132.—Skull of Ursine Seal.

gamous, and live in families, every male being surrounded by a crowd of females (from fifty to eighty), whom he guards with the greatest jealousy. These families, each, including the young, amounting to 100 or 120, live separate, though they crowd the shore, and that to such an extent on the islands off the north-west point of America, that it is said they oblige the traveller to quit it and scale the neighbouring rocks. Both male and female are very affectionate to their young, and fierce in their defence; but the males are often tyrannically cruel to the females, which are very submissive. If one family encroaches on the station of another, a general fight is the consequence. They will not, in fact they dare not, leave their stations, for if they did they must encroach on that of some other family. Steller relates that he had been beset by these seals for six hours together, and was at last obliged to climb a precipice to get rid of the infu-



133.—Ursine Seal.

riated animals, at the imminent peril of his life. They have their own notes and several other intonations. When amusing themselves on the shore they low like a cow, chirp like a cricket after a victory, and, when they are wounded, cry like a whelp. They swim very swiftly, and are as great a terror to other seals as the sea-lion (*Phoca jubata*, Gmel.) is to them.

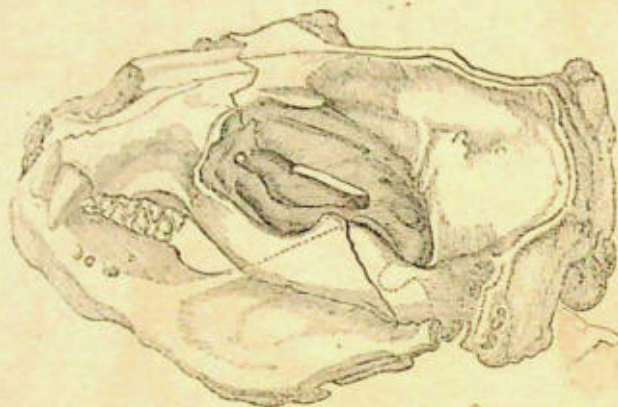
The skin of the ursine seal is very thick, and from its full deep fur makes excellent winter clothing. Steller speaks of a garment which he made for himself from one, when he was in Behring's Island, with grateful remembrance.

#### FORSTER'S SEA-LION

(*Platyrrhynchus Fosteri*); *Otaria Fosteri*, Less., in 'Diet. Class.;' *Phoca Forsteri*, Fischer.

The genus *Platyrrhynchus* differs little from *Arctocephalus*, except in a few minor points in the dentition,

in the greater elevation of the cerebral region of the skull, and in the enlargement of the muzzle. There are external ears. Fig. 134 represents the skull.



134 - Skull of Sea Lion.

Several species of seal have been termed sea-bears or ursine seals; and several sea-lions, among which may be mentioned the huge elephant-seal already described. Dr. Hamilton considers, however, that three distinct members of the present genus have been thus designated:—1, the sea-lion of Steller (*Phoca jubata*, Gmelin), inhabiting the eastern shores of Kamtchatka and the Kurile Islands; 2, the sea-lion of Forster (*Leo marinus*, Buff.), a native of the southern hemisphere; and 3, the sea-lion of Pernetty (*Platyrrhynchus leoninus*, F. Cuvier), a native of the Falkland Islands.

Forster's sea-lion is a native of the southern seas, frequenting the Magellanic coast, Terra del Fuego, and the Magellanic Islands. The skin is thick, the hair reddish, yellowish, or dark brown; no fur or short wool under the long hair. A mane on the neck of the male reaches to the shoulders. Head small in proportion to the body,

which is everywhere equally thick-looking, as Buffon describes it, like a great cylinder, more suited for rolling than walking. Ears, conical, about six or seven lines long; cartilage firm and stiff, but yet rather curled at the margin. Upper lip overhanging the lower, both furnished with long, coarse, black whiskers, which become white with age. Length from ten to fourteen feet; the females shorter and more slender. (Fig. 135.)



135.—Forster's Sea-Lion.

Captain Cook states that it is not at all perilous to go among these animals, for they either fled or stood still. The only danger was in going between them and the sea; for if they took fright at anything, they would come down in such numbers, that the person in the way would be run over. When he and his party came suddenly upon them, or waked them out of their sleep, they would raise up their heads, snort and snarl, and look

fierce, as if they meant to devour the intruder; but when the men advanced, the sea-lions always ran away. He states that the male is surrounded by from twenty to thirty females, and that he is very attentive to keep them all to himself, beating off every mâle that attempts to come to his flock. Others, again, had a less number, some no more than one or two; and here and there was seen one lying growling in a retired place, suffering neither males nor females to come near him. These he judged to be old and superannuated.

Forster relates that the rocks along the shore in New Year's Harbour were covered with multitudes of these sea-lions. "We put into a little cove under the shelter of some rocks," says he, "and fired at some of these fierce animals, most of which immediately threw themselves into the sea. Some of the most unwieldy however kept their ground, and were killed by our bullets. The noise which all the animals of this kind made was various, and sometimes stunned our ears. The old males snort and roar like mad bulls or lions, the females bleat exactly like calves, and the young cubs like lambs. They live together in numerous herds. The oldest and fattest males lie apart, each having chosen a large rock to which none of the rest dare approach without engaging in furious combat." Forster goes on to relate that they were often seen to seize each other with an indescribable degree of rage, and that many of them had deep gashes on their backs, which they had received in the wars. The younger active sea-lions, with all the females and the cubs, lay together. They commonly awaited the approach of the people; but as soon as some of the herd were killed, the rest precipitately fled, some females carrying off a cub in their mouths, while many were so terrified that they left the young behind. When undisturbed, they were often observed caressing each other in the most tender manner, and their snouts often met together as if they were kissing. The same author states that they come on shore on those uninhabited spots to breed, and that they do not feed during their stay on land, which sometimes lasts for several weeks; they then

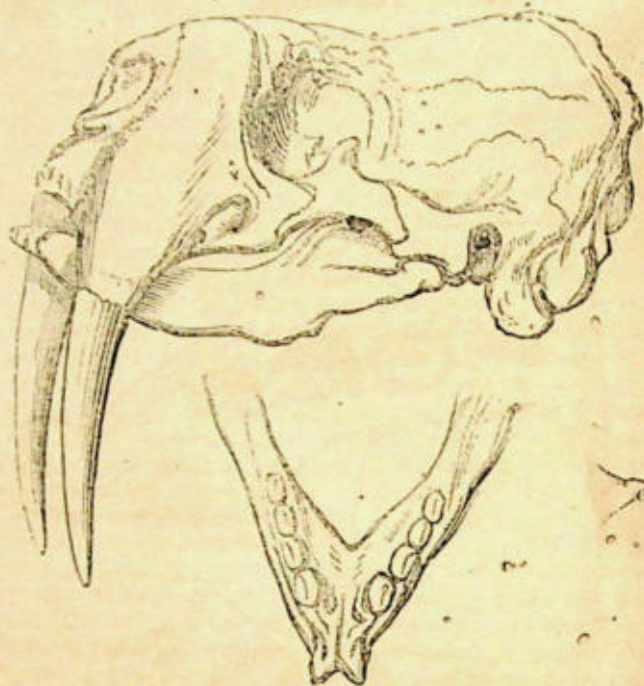
grow lean, and swallow a considerable quantity of stones to distend the stomach. He adds that the stomachs of many of them were found entirely empty, and those of others were filled with ten or twelve round heavy stones, each of the size of two fists.

### THE WALRUS, OR MORSE (*Trichecus Rosmarus*).

Leaving the genuine seals, we come to the genus *Trichecus*, of which we are acquainted with only one species, the Walrus or Morse and Sea-cow of the British; Morse, Vache Marine, Cheval Marin, and Bête à la grande dent of the French. It is the Horse-whale or Whale-horse (*Hval-ros*) of Oether the Norwegian, who, about the year 890, made his report of it to Alfred, as having in its teeth bones of great price and excellency, some of which he brought to the king on his return from his voyage beyond Norway; also Rosmar of the Norwegians; Morss or Morsh of the Russians; and Morsk of the Laplanders.

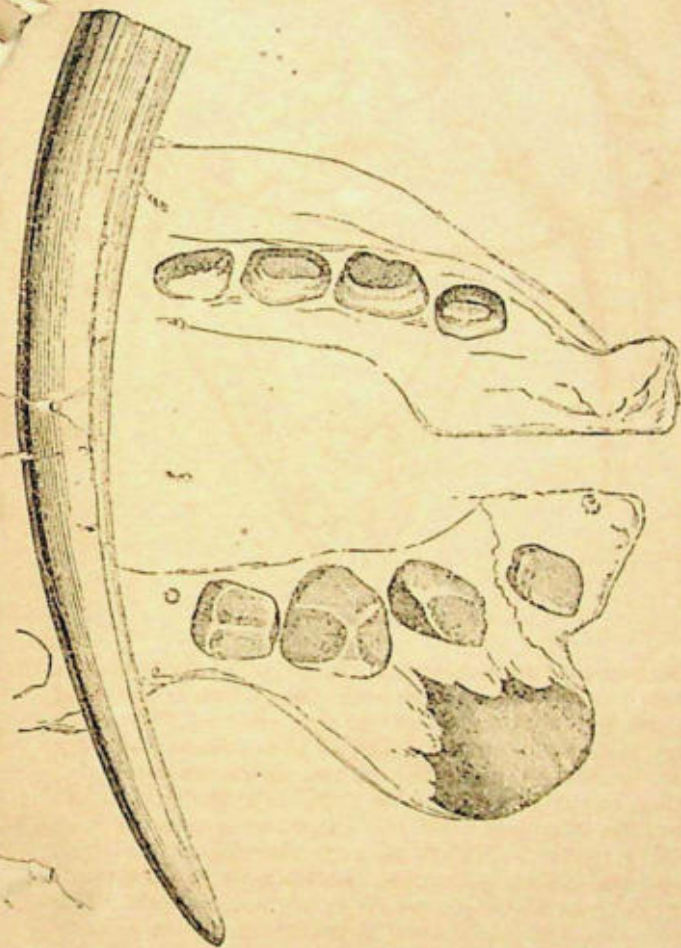
The walrus is a native of the polar regions of both hemispheres, and it is more than probable that the arctic animal is specifically distinct from the antarctic, though in habits and manners they agree precisely. The arctic walrus has occasionally visited the British shores, and is therefore figured by Mr. Bell in his 'History of British Quadrupeds,' though it can scarcely be accounted one of their number. In general form, no less than in habits, the walrus closely resembles the larger species of seals, but it differs from all the species of this group in the general contour of the skull and in the dental formula. Fig. 136 represents the skull and lower jaw; Fig. 137 the molars and a tusk of this animal.

The first peculiarity which strikes us in the skull of the walrus consists in the enormous magnitude of the canine teeth of the upper jaw, which are from eighteen inches to two feet in length, stout and solid, with large roots imbedded in protuberant alveoli, or sockets, occupying the anterior part of the muzzle, and rising above the cranium, which appears of disproportionate volume.



136.—Skull and Lower Jaw of Walrus.

The immense development of the alveoli of these canines gives a swollen appearance to the face, which is increased by the tumid character of the lips, covered with thick wiry moustaches. The dentition is as follows:—Upper jaw: incisors four, of which the two middle are deciduary, falling out at an early period; the two lateral have the character of molars. Of the enormous canines we have already spoken. Molars on each side four, cylindrical, short, and obliquely truncate. Lower jaw: incisors wanting; canines wanting; molars as in the upper jaw. The lower jaw is not only small in proportion to the general volume of the skull, but is compressed as it proceeds, in order to fit in between the huge canines of the upper



137.—Molars and Tusk of Walrus.

jaw, which sweep with a gentle curve perpendicularly downward. The nostrils, in consequence of the development of those imbedded in the maxillary bones, are thrown upwards, so as to open considerably above the muzzle with a vertical aspect. The eyes are small, but brilliant; the orifices of the ears are placed very far backwards on the head; the neck is short and thick; the chest of great volume; the tail short; the body thinly clothed with short stiff brownish hair; the hinder paddles are large. In length the walrus attains to fifteen or sixteen feet, and its body not only yields abundance of oil, but its skin is highly valued for its toughness and durability. The tusks of this animal, which remind us of those of the elephant, are instruments both of defence and of progression; by their aid it assists itself in clambering up floating icebergs, or in traversing the fields of ice along the shore, to which it resorts both to rest and breed. It uses them also with great effect in defending itself from the attacks of the polar bear, which may be regarded as its most formidable adversary; and with which it often engages in bloody conflicts. But there is also another use to which these tusks are destined: the walrus feeds to a great extent on a species of marine vegetable, the *fucus digitatus*, and these instruments are admirably calculated for tearing up the long wreaths of seaweed fast rooted in the bed of the ocean. Besides this vegetable, they also feed upon other aliment; Mr. Scoresby found in their stomachs shrimps, a kind of crayfish, and the remains of young seals. They are probably omnivorous. (Fig. 138.)

The walrus, like the seal, is gregarious in its habits, and is often observed in vast flocks reposing upon the ice, or upon rocky islands or sand-banks; on these occasions some appear to act as sentinels, and give notice of the approach of an enemy; their voice is a loud roar or bray, and may be heard at a considerable distance: Captain Cook observes that in the night or in foggy weather, the roaring of the walruses gave notice of the vicinity of the ice before it could be seen. When attacked or fired at, the whole troop rushes tumultuously



138.—Walrus, or Morse.

into the sea; should one be wounded, its companions hasten with loud cries to the rescue, and, emboldened by their numbers, assail the boat with great ferocity, and endeavour to upset or break it with their powerful tusks. The thickness and toughness of the skin render it no easy matter to drive a lance or harpoon into the animal's body, and a sharp weapon not unfrequently glances off without piercing. When wounded on shore, the morse turns furiously upon its adversary, striking right and left with its tusks, and endeavouring to dash him to the ground; then, roaring with pain and fury, it makes off into the sea, where it is joined by its companions. Zörgdrager, in his description of the Greenland fishery (1750), states that, before the morse had been so persecuted, large troops would often advance on the shore to a considerable distance from the edge of the water, so that it was easy to cut off their retreat, and the more so as the animals exhibited no alarm on seeing the approach of the hunters, who would often kill several before the

rest attempted to regain the sea. As is the case with the whale, the annual slaughter made among these animals for the sake of their oil, and of their tusks, which are of the finest ivory, has thinned their numbers, or driven them from haunts where they formerly abounded, to seek shelter in more inaccessible localities. That they are not without courage or sympathy for their wounded companions there is ample testimony. When Martens wounded one, others speedily surrounded the boat, and, whilst some endeavoured to pierce it with their tusks, others raised themselves out of the water and endeavoured to board her. Captain Phipps, afterwards Lord Mulgrave, relates that, when near a low flat island opposite Waygat's Straits, in 1773, two of the officers went in a boat in pursuit of sea-horses. They fired at one and wounded it. The animal was alone when it was wounded, but, diving into the sea, it brought back a number of others. They made a united attack upon the boat, wrested an oar from one of the men, and were with difficulty prevented from staving or oversetting her; but a boat from the Carcass joining that from the Racehorse, they dispersed. Captain Phipps adds that one of the ship's boats had before been attacked in the same manner off Mofsen Island. Sir Edward Parry encountered about two hundred in Fox's Channel, lying piled as usual over each other on the loose drift-ice. A boat's crew from both the Fury and Hecla went to attack them, but they made a desperate resistance, some with their cubs mounted on their backs, and one of them tore the planks of a boat in two or three places. Their parental affection is great. Captain Cook states that on the approach of the boats, which were hoisted out to attack them in Behring's Straits, all the walrus took their cubs under their fins, and endeavoured to escape with them from the ice into the sea. Several whose young were killed and wounded, and were left floating on the surface, rose again and carried them down, sometimes just as the people were going to take them into the boat; and they might be traced bearing them to a great distance through

the water, which was coloured with their blood. They were afterwards observed bringing them up at times above the surface, as if for air, and again diving under it with a dreadful bellowing. The female, in particular, whose young had been destroyed and taken into the boat, became so enraged that she attacked the cutter, and struck her tusks through the bottom of it.

In the arctic regions the flesh of the walrus is held by the natives in great estimation; Sir Edward Parry remarks that the flesh was tolerably good, affording variety amid the ordinary sea-fare. The ivory is finer than that of the elephant; the skin makes excellent carriage-harness; and the oil is valuable, though only from twenty to thirty gallons are yielded by a single carcase; its blubber, as Crantz says, being white and solid like bacon, and a hand's breadth thick, but not giving out much fluid oil.

Seals' flesh, says Crantz, supplies the Greenlanders with their most palatable and substantial food; the fat enriches them with oil for lamp-light, chamber and kitchen fire; and whoever sees their habitations presently finds that, even if they had superfluity of wood, it would not be of use—they can use nothing but oil in them. They also mollify their dry food, mostly fish, with oil; and finally they barter it for all kinds of necessaries with the factor. They can sew better with fibres of the seal's sinews than with thread or silk; of the skin of the entrails they make window-curtains for their tents, and shirts; part of the bladder they use as a float to their harpoons, and they make oil-flasks of the stomach. Neither is the blood wasted, but is boiled up with other ingredients and eaten as soup. Of the skin of the seal they stand in the greatest need, because they must cover with seal-skins both the large and small boats in which they travel and seek their provisions. They must also cut out of them their thongs and straps, and cover their tents with them, without which they could not subsist in summer. No man therefore can pass for a right Greenlander who cannot catch seals. This is the

ultimate end they aspire at in all their device and labour from their childhood up." To the Greenlander, then, the sea is his pasturage, where his flocks and herds are fed: the sea is his hunting-domain, where, in his light kajak, he skims over the waves:

"There tumbling in their seal-skin boat,  
Fearless the hungry fishers float,  
And from the teeming seas supply  
The food their niggard plains deny."

---

and allowed themselves to be slaughtered almost without making resistance." In the government of Livonia, in Russia, a district of about two hundred and fifty miles long and one hundred and fifty broad, the following animals were, according to official reports, destroyed by wolves in 1822:—horses, 1841; fowls, 1243; cattle, 1807; calves, 733; sheep, 15,182; lambs, 726; goats, 2545; kids, 183; swine, 4190; young pigs, 312; dogs, 703; geese, 673.

Desmarest says that the wolf is solitary and nocturnal, but that in winter it unites in troops, which attack horses and men. The sense of smell is very acute, but its speed is not very great, and it wears out its victim by dint of untiring perseverance. When in full chase of its prey, it gallops along, pertinaciously following the track of the fugitive. The description of a troop of wolves in pursuit is admirably given by Lord Byron in his poem of 'Mazeppa':—

"We rustled through the leaves like wind,  
Left shrubs and trees and wolves behind;  
By night I heard them on the track,  
Their troop came hard upon our back.  
With their long gallop, which can tire  
The hound's deep hate and hunter's fire;  
Where'er we flew they follow'd on,  
Nor left us with the morning sun;  
Behind I saw them scarce a rood  
At daybreak winding through the wood,  
And through the night had heard their feet  
Their stealing, rustling step repeat."



2.—From Egyptian Sculpture.

From the numerous allusions to the wolf in the Scriptures, it is evident that it must have been well

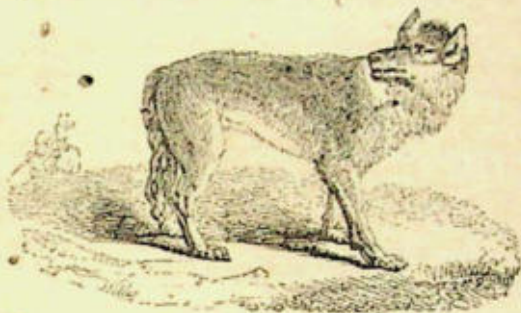
known formerly in Syria—and indeed also in Egypt, for we find it figured on ancient sculptures, together with the hyæna and greyhound. (Fig. 2.) At present, however, this animal is seldom met with in Syria, although it still exists in that region, but keeps itself concealed.

So habitually cautious and suspicious is the wolf, that it is difficult to take it in traps, and for the same reason anything like the appearance of artifice deters it from an attack. (Fig. 3.) It has been supposed the wolf never carries his tail elevated, but this is not altogether correct; we have often watched the wolves in the Zoological Gardens gallop round the enclosure with the tail raised as it is also when the animals are in chase of prey; and, as Dr. Richardson states from observation, when they gambol with each other.



3.—Wolf in Trap.

When pursued the wolf rushes along, with his muzzle almost to the ground, his eyes like glowing fire, the hair of his neck and shoulders erect, and his tail lowered and drawn close; when out of danger, he slackens his pace, raises his head, sniffs about, and whisks his tail around, as if exulting in his escape; but if brought to bay by hounds, he defends himself to the last, and often kills and maims some of his antagonists before he falls overpowered by numbers. The Kirghese Tartars employ a large hawk in the chase, which fastens upon the animal's head, and tears its eyes. (Fig. 4.)



4.—Wolf.

Fierce as the wolf is, like the hyæna it can be tamed and even domesticated, but they require to be taken very young. M. F. Cuvier gives a very interesting account of a tame wolf, which showed all the affection that the most gentle dog could evince towards its master. When full-grown, he was presented by his owner to the menagerie at Paris. For many weeks he was quite disconsolate at the separation from his master, who had been obliged to travel; he would scarcely take any food, and was indifferent to his keepers. At length he became attached to those about him, and he seemed to have forgotten his old affections. His master returned after an absence of eighteen months; the wolf heard his voice amidst the crowd in the gardens of the menagerie, and, being set at liberty, displayed the most violent joy. Again was he separated from his friend, and again was his grief as extreme as on the first occasion. After three years' absence, his master once more returned. It was evening, and the wolf's den was shut up from any external observations; yet the instant the man's voice was heard, the faithful animal set up the most anxious cries; and the door of his cage being open,

he rushed towards his friend, leaped upon his shoulders, licked his face, and threatened to bite his keepers when they attempted to separate them. When the man left him, he fell sick, and refused all food; and from the time of his recovery, which was long very doubtful, it was always dangerous for a stranger to approach him. He appeared as if he scorned any new friendships.

Other instances of domestication are on record, and, indeed, from our own personal experience, we hesitate not to state that the wolf may be completely reclaimed—more so than the Australian dingo.

The power of the wolf, especially in the muscles of the head, neck, and shoulders, is immense; and his bite is terribly severe, generally cutting out the flesh with a snap. Among themselves they fight often with great desperation, the combat ending with the death of the weaker. It is said that wolves wounded by the gunshot of hunters or travellers are torn in pieces and devoured by their fellows.

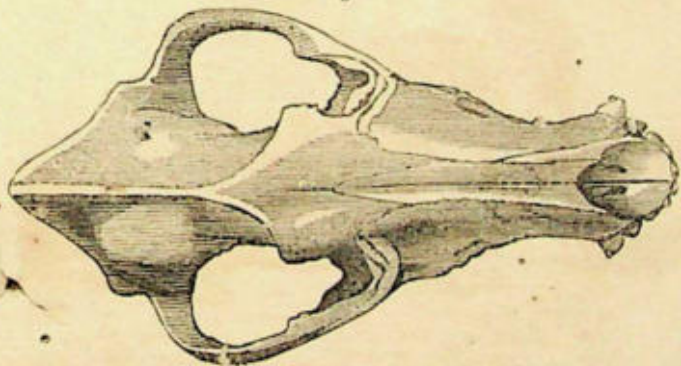


5.—Mixed Breed of Dog and Wolf.

The average height of the wolf at the shoulders is about two feet six inches; the female rears her young in some cave or gloomy recess, and produces from five to nine young at a birth. These are born with the eyes closed, as in the dog. In the defence of her offspring the female is furious, and greatly to be dreaded. The voice of the wolf is a prolonged howl, resounding dismally through the stilly darkness of the night. The wolf will breed with the dog, and we give (Fig. 5)



Fig. 5.



7.—Skull of European Wolf.

specimens of the mixed breed ; but it is not to be thence concluded, as Hunter does, that they are all of one species : no one, we think, will now regard the wolf and the jackal as identical ; nor is there any more ground for believing that the dog is either the one or the other, than for assuming that the wolf and the jackal are one.

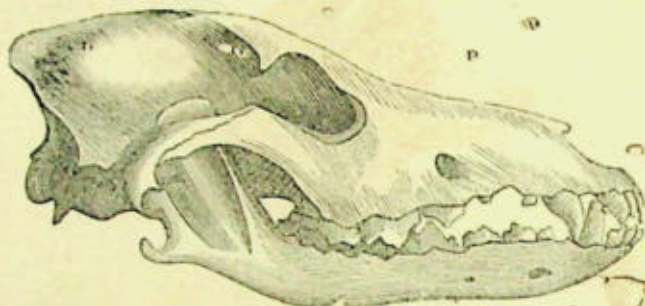
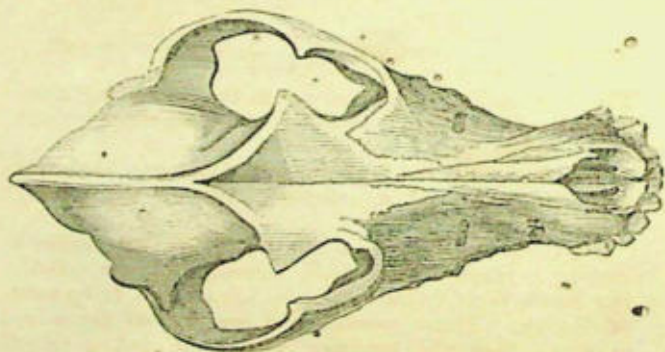


Fig. 8.



9.—Skull of Canadian Wolf.

Figs. 6 and 7 are the skull of the European wolf, in two views : it differs in various minor details from the skull of the Canada wolf, of which Figs. 8 and 9 are two similar views.

Fig. 10 is a spirited delineation of the head of the wolf, for comparison with that of the nearest of the dogs, and we add the dentition, though it has been given in the preceding volume.



10.—Head of Wolf.

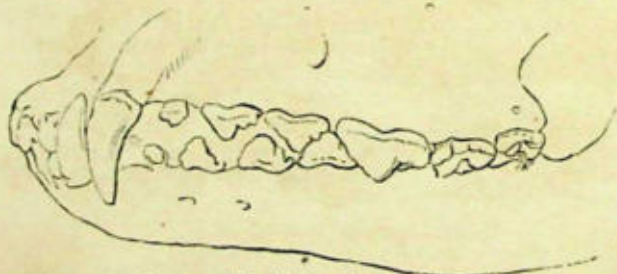
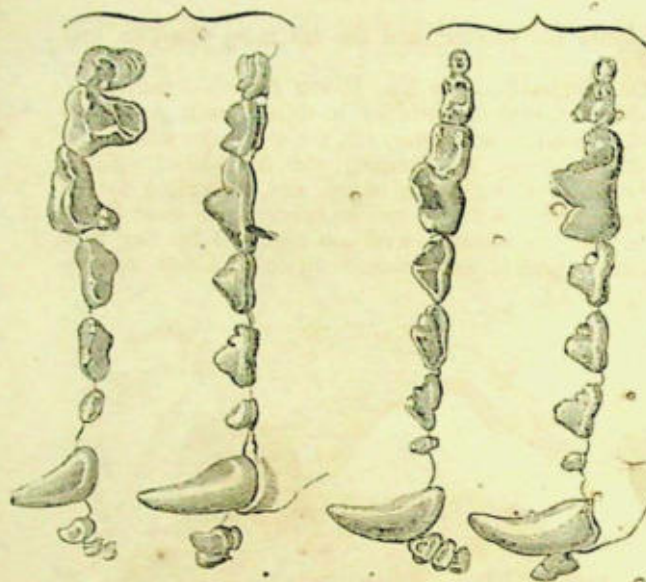
Dental formula:—Incisors,  $\frac{6}{6}$ ; Canines,  $\frac{1-1}{1-1}$ ; Molars—false  $\frac{3-3}{4-4}$ , carnassières  $\frac{1-1}{1-1}$ , true  $\frac{2-2}{2-2} = 42$ .

The true molars below are small, the last being even minute, as is the first false molar, and often dropping out early. (Fig. 11.)

The family has the fore feet with five toes; hind feet with four toes, and sometimes a fifth on the tarsus; claws not retractile.

On the southern side of the Pyrenees there exists a variety perhaps of the wolf, termed, from its colour, the Black Wolf (*Canis Lycaon*, Linn.), the Loup noir of Buffon. These animals are asserted to be more ferocious than the ordinary gray wolf, but perhaps without any foundation.

The common wolf of North America differs in some respects from its European relative, and is perhaps a distinct species. It wants the gaunt appearance, the comparatively long jaw and tapering nose, the high ears;



11.—Teeth of Dog.

long legs, slender loins, and narrow feet of the European wolf. Its frame also is more compact, the fur finer and thicker, the muzzle more obtuse, the head larger and rounder, and the forehead broader and more arched:

the limbs are shorter, and the tail more fox-like and bushy.

Dr. Richardson, in his 'Fauna Boreali-Americana,' enumerates several varieties of this North American wolf, depending on colour, viz. the gray, the white, the pied, the dusky or clouded, and the black. Black wolves abound on the Missouri, and, according to the Indians, black and gray wolves occur in the same litter. The dusky or clouded wolf was regarded by Say as a distinct species, and named by him *Canis nubilus*. (Fig. 12.)



12.—Dusky or Clouded Wolf.

The American wolf agrees in its general habits with the wolf of our continent, though it appears to be less formidable as far as man is concerned. Indeed Captain Lyons, in his observations on the wolves of Melville Peninsula, states that both English and Esquimaux were accustomed to pass them without any weapon, or even a

stick; "the animals, however, exhibited no symptoms of fear, but rather a kind of tacit agreement not to be the beginners of a quarrel, even though they might have been certain of proving victorious."

These wolves hunt in packs, and when pressed for food their audacity is astonishing. They will seize the Esquimaux dogs before their masters' faces, and carry them off—for though bolū in attacking the bear, this breed of dogs, as previously noticed, fears the wolf, and makes but a slight resistance. They have been known not only to steal provisions from under a man's head in the night, but even to come into a traveller's bivouac and carry off some of his dogs. "During our residence at Cumberland House, in 1820," says Dr. Richardson, "a wolf which had been prowling round the fort, and was wounded by a musket-ball and driven off, returned after it became dark, whilst the blood was still flowing from its wound, and carried off a dog from amongst fifty others, that howled piteously, but had not courage to unite in an attack on their enemy."

The American Wolf is extremely cunning, and in attacking moose or Wapiti deer, animals which exceed it in speed, it has recourse to a singular stratagem. Several combine, and arrange themselves in the form of a semicircle, and thus advance upon their prey, so as either to hem it in or drive it over a precipice. Captain Franklin often found the remains of deer which had been thus dashed down steep cliffs and devoured, and he states that this is a frequent expedient when the plains are bounded by precipitous cliffs. "Whilst the deer are quietly grazing, the wolves assemble in great numbers, and, forming a crescent, creep slowly towards the herd, so as not to alarm them much at first; but when they perceive that they have fairly hemmed in the unsuspecting creatures, and cut off their retreat across the plain, they move more quickly, and with hideous yells, terrify their prey, and urge them to flight by the only open way, which is towards the precipice; appearing to know that, when the herd is once at full speed, it is easily driven over the cliff, the rearmost urging on those that

are before. The wolves then descend at leisure, and feed on the mangled carcases."

On one occasion a troop of wolves endeavoured to put the same stratagem into practice against Dr. Richardson. Having the first watch, he "had gone to the summit of a hill, and remained seated, contemplating the river that washed the precipice under his feet, long after dusk had hid distant objects from his view. His thoughts were perhaps far distant from the surrounding scenery, when he was roused by an indistinct noise behind him; and, on looking round, perceived that nine white wolves had ranged themselves in form of a crescent, and were advancing apparently with the intention of driving him into the river. On his rising up, they halted; and when he advanced, they made way for his passage down to the tents."

A recent writer in 'Blackwood's Magazine,' (No. 393,) while describing in a vivid manner 'Life in the Far-West,' says there are four kinds of wolves frequenting that district, and gives the following interesting account of some of their habits:—

"The white wolf is the invariable attendant upon the buffalo; and when one of these persevering animals is seen, it is a certain sign that buffalo are not far distant. Besides the buffalo-wolf, there are four distinct varieties common to the plains, and all more or less attendant upon the buffalo. These are, the black, the gray, the brown, and last and least the coyote, or cayote, of the mountaineers, the '*wach-unhamänet*' or 'medicine-wolf' of the Indians, who hold the latter animal in reverential awe. This little wolf, whose fur is of great thickness and beauty, although of diminutive size, is wonderfully sagacious, and makes up by cunning what it wants in physical strength. In bands of from three to thirty, they will not unfrequently station themselves along the 'runs' of the deer and the antelope, extending their line for many miles,—and the quarry being started, each wolf will follow in pursuit until tired, when it relinquishes the chase to another play, following slowly after until the animal is fairly run down, when all hurry to the spot and

speedily consume the carcase. The cayute, however, is often made a tool of by his larger brethren, unless, indeed, he acts from motives of spontaneous charity. When a hunter has slaughtered game, and is in the act of butchering it, these little wolves sit patiently at a short distance from the scene of operations, while at a more respectful one the larger wolves (the white or gray) lope hungrily around, licking their chaps in hungry expectation. Not unfrequently the hunter throws a piece of meat towards the smaller one, who seizes it immediately, and runs off with the morsel in his mouth. Before he gets many yards with his prize, the large wolf pounces with a growl upon him, and the cayute, dropping the meat, returns to his former position, and will continue his charitable act as long as the hunter pleases to supply him.

“Wolves are so common on the plains and in the mountains, that the hunter never cares to throw away a charge of ammunition upon them, although the ravenous animals are a constant source of annoyance to him, creeping to the camp fire at night, and gnawing his saddles and *apishamores*, eating the skin ropes which secure the horses and mules to their pickets, and even their very hobbles, and not unfrequently killing or entirely disabling the animals themselves.

“Round the camp, during the night, the cayute keeps unremitting watch, and the traveller not unfrequently starts from his bed with affright, as the mournful and unearthly chiding of the wolf breaks suddenly upon his ear: the long-drawn howl being taken up by others of the band, until it dies away in the distance, as some straggler passing within hearing answers to the note, and howls as he lopes away.”

In the dreary realms that advance into the Polar Sea,

“Where the wolf and Arctic fox  
Prowl amidst the lonely rocks,”

Captain Franklin and his companions, during their arduous journeys, were often obliged to dispute their

scanty food with the lean wolves, that would scarcely retreat. On one occasion, when they had captured a moose deer, and had buried a part of the body, the wolves absolutely dug it out from their very feet, and devoured it, while the weary men were sleeping. On another occasion, when the travellers had killed a deer, they saw by the flashes of the Aurora borealis eight wolves waiting round for their share of the prey. Sometimes, however, the wolves were their caterers, and helped them to a welcome meal. When a group of wolves and a flight of crows were discovered, the travellers knew there was a carcass to be divided, and they sometimes succeeded in obtaining a share of the prey, if it had been recently slaughtered.

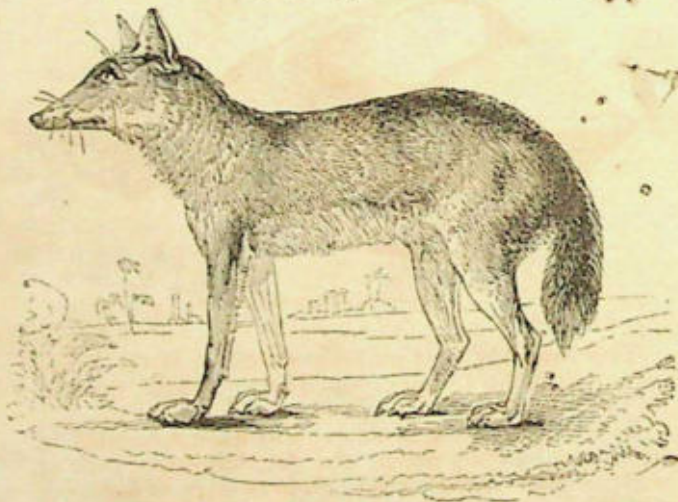
Of the American wolves we may notice the Prairie wolf (*Canis latrans*, Say), which inhabits the plains of the Missouri and Saskatchewan, as well as those of the Columbia. It is smaller and fleetier than the common wolf, associates in large troops, and dwells in burrows on the plains remote from the forests. In Mexico is found a distinct species of wolf (*Canis Mexicanus*, Desm.); and a species termed the red wolf (*Canis jubatus*, Desm.) inhabits the Pampas of La Plata. The Antarctic wolf (*Canis Antarcticus*, Desm.) is a native of the Falkland Isles, and seems to be an intermediate link between the wolves and foxes. It feeds principally upon a species of goose (*Anser leucopterus*), goes in packs, which wander about by day, but more commonly in the evening, and dwell in holes which they burrow. This species is about fifteen inches in height at the shoulder; the tail is short, and white at the tip; the limbs are short, but the contour of the head is wolf-like. It is termed by Pennant the Antarctic Fox.

Colonel Sykes has described a wolf from Dukhun, under the title of *Canis pallipes*, which he states to be numerous in the open stony plains of that region, but not to be met with in the woods of the Ghauts. ('Zool. Proceeds.' 1830.)

Mr. Hodgson notices the common European wolf as occurring in the lower region of the Nepal Mountains.

THE JACKAL. (*Canis aureus*.)

Of the animals known by the name of Jackals, one species (*Canis anthus*) is a native of Senegal; another, the Cape jackal (*Canis mesomelas*), is a native of the Cape of Good Hope; and a third, the common jackal (*Canis aureus*), is spread from the north of Africa, through Syria, Persia, and the greater part of India. Colonel Sykes states it to be numerous in Dukhun, where it is called Kholah by the Mahrattas. It is somewhat larger than a fox, but its tail is shorter in proportion, reaching only to the hock; its head is short, with a pointed muzzle; the general colour above is gray, abruptly divided from a paler tint spread over the under surface; the tail is slightly tipped with black. (Fig. 13.)



13.—Jackal.

Figs. 14 and 15 represent the skull of the Jackal, in two views; it differs from those both of the European and American wolf. These skulls may be compared with those of the various breeds of dogs previously given.

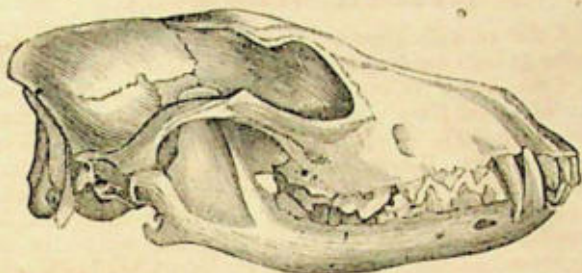
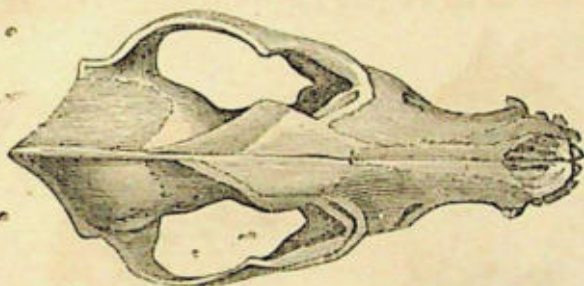


Fig. 14.



15.—Skull of Jackal.

This animal is most probably the Shual of the Scriptures. It is the Chical of the Turks; Sciagal, Sciugal, Sciachal, or Shacal of the Persians.

The jackal dwells in troops, which lie concealed in holes and burrows during the day, but come forth at night to hunt for food, giving chase to sheep or antelopes and other animals, like the wolf, stealing fox-like into fowl-roosts, and attacking any animal they are capable of overcoming. (Fig. 16.) They do not, however, confine themselves to living prey, carrion and offal of every description being greedily devoured. Nor are roots and fruits less acceptable; in the vineyard, indeed, they



make great havoc, and their fondness for grapes is notorious. The "shriek" of the jackal is terrific. Those travellers who have heard them, describe the nocturnal yells of these animals as extremely piercing and dissonant; now close, now at a distance, troop answering troop from different points, themselves unseen, while their fearful chorus breaks the stillness of the hours of darkness. Their cries thus heard amidst the ruins of cities of ancient date might seem "to listening Fancy's ear" like the wail of legions of spirits over the departed glories of other days. Mouldering ruins, fallen temples, crumbling tombs, and craggy rocks are the abodes of the jackal.

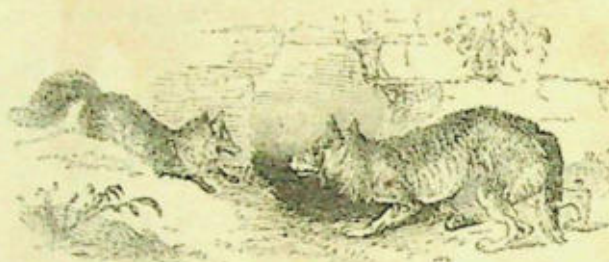
Sly and suspicious in its disposition, this animal when taken young is nevertheless easily tamed, and loses that unpleasant odour which renders the wild animal almost unbearable. We have seen in the Zoological Gardens a hybrid between the jackal and dog.

#### THE COMMON FOX.

(*Canis vulpes*, Linn.; *Vulpes vulgaris*, Brisson). Volpe of the Italians; Rapasa, Spanish; Rapoza, Portuguese; Fuchs, German; Vos, Dutch; Raff, Swedish; Rev, Danish; Tod, Scottish provincialism; Llwynog, and female Llwynoges, of the Welsh. (Fig. 17.)

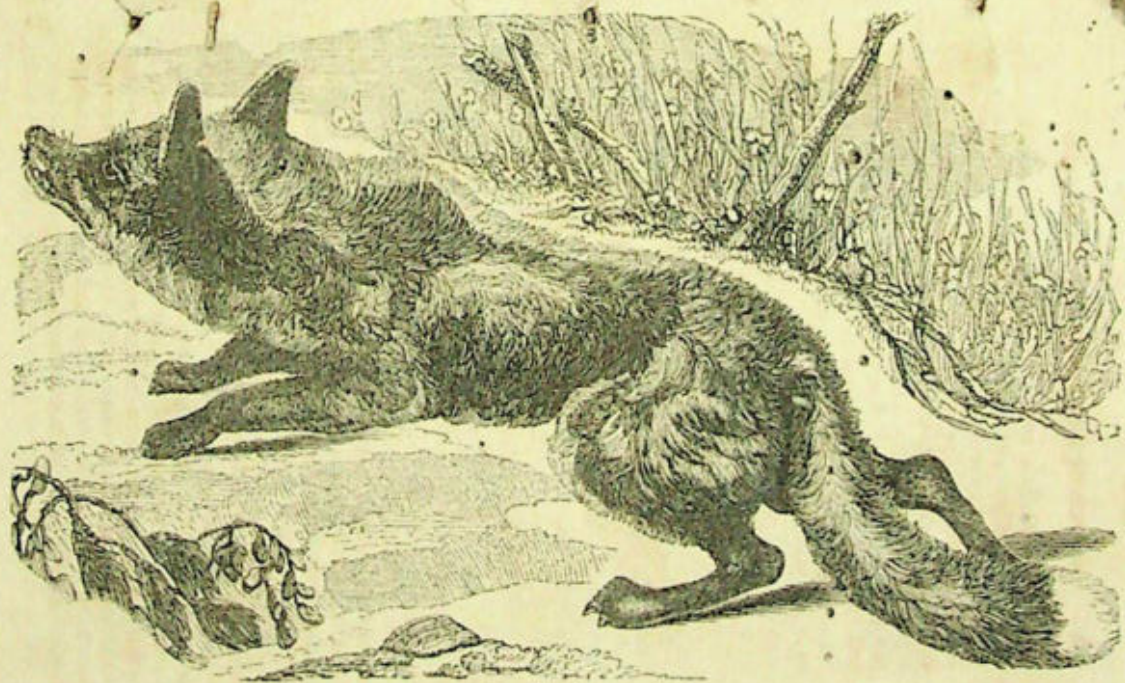
The common fox (the representative of the sub-genus *Vulpes*, characterised by a linear pupil and a long bushy tail) is too well known to need a minute description. This wily animal is common in our island, and in most parts of Europe, extending into Northern Asia, and is everywhere celebrated for its cunning and rapacity. As its linear pupil intimates, the fox is crepuscular or nocturnal in its habits, but is occasionally seen abroad during the day. In general, however, it is as the dusk of the evening advances that the fox steals from its burrow, with noiseless steps, to prowl about for prey. His senses of smell and hearing are extremely keen, and he listens, and snuffs the breeze; attentive to every sound, appreciating

every odour. His eyes gleam, as he creeps along in a crouching attitude, intent upon his prey. His movements are all stealthy: he surprises the rabbit gambolling near its burrow; the hare in her form; the poultry on the perch. He slaughters all he can, reserving the overplus for a future exigency, and for that purpose buries it in the earth. In times of scarcity field-mice, frogs, weasels, and even insects are devoured. On the Continent the fox visits the vineyards, being as partial to the ripe grapes as is the jackal.



17.—Wolf and Fox.

The fox is solitary in his habits, and dwells alone in a burrow, which he has either made or usurped, and which is generally in some secluded situation, not readily to be discovered, and in the neighbourhood of a rabbit-warren, preserves of game, or farms. Its power of endurance and its speed have in our country recommended it to all lovers of the chase, for whose gratification the breed is preserved where possible. Foxes have been known to run before the hounds fifty miles at a stretch: when hard pressed, the animal neither loses his courage nor self-possession; he puts in practice every expedient which cunning dictates, to baffle the hounds or conceal him from their search; and if all fail, he dies defending himself to the last, without uttering a cry.



17.\*—The Common Fox.

In all ages the fox has been celebrated for its wiles and cunning, and in a country like our own, where it has more than ordinary occasion for the exercise of craft and watchfulness, it becomes doubly suspicious. Hence the most tempting bait will scarcely ever induce it to enter a trap. The disposition of the fox is portrayed in the expression of its physiognomy. The sharp ears and muzzle, the oblique eye with a linear pupil, and the peculiar curl of the upper lip, displaying the canine teeth, and especially observable when the animal is excited and ready to snap, proclaim a mixture of craftiness, vigilance, and fierceness.

When prowling in the dusk, or watching for rabbits along the borders of the coppice, it proceeds with its limbs bent in a crouching attitude, with ears erect and gleaming eyes, intent upon its prey, and at the same time quick to take the slightest alarm and dart off to the place of its concealment. The figure in the preceding page is an admirable delineation of the fox on his twilight prowl, stealthily creeping upon his victim, yet alive to his own danger. Though the fox is nocturnal in his habits, he is not exclusively so; it is not often, however, that he ventures abroad during the day. We have ourselves once or twice seen a fox by the edge of a wood in full day; and, during a recent visit to Essex, two foxes were observed in the afternoon in a bean-field, near a farm-yard, the scene of many of their exploits. In the same farm-yard, a few weeks previously, the shepherd's dog (a powerful animal) surprised and seized a fox in the morning, who defended himself with the utmost determination, when one of the men coming to the dog's assistance (which was not needed), in endeavouring to strike the fox with a stick, struck the dog, upon which the latter let go his hold and allowed the fox to escape.

Innumerable are the stratagems which the fox employs in the acquisition of his prey. He reconnoitres the precincts of the farm-yard, and acquaints himself with its topography, and the arrangement of the sheds and buildings; neither a high wall nor palings obstruct

him: he leaps over the one, or creeps under the other, glides noiselessly to the poultry-house, and seizes his victim, often without disturbing the rest of the feathered sleepers: generally, however, he is not content with one, but puts most or all to death, for he has not only to gratify his instant appetite, but to provide against a future day. Domestic poultry, ducks, or geese, are equally acceptable. In this habit of providing for future contingencies, the fox resembles the dog, which we know buries the bones he does not want at the time, returning to them when his inclination tempts him. Thus the fox, having made havoc among ducks or fowls, if time permits, carries them off, and hides them in the earth, not in a single place, but in many places, so that, if one of his hoards be discovered by a brother robber, he has other resources to apply to. Dr. Weissenborn assures us, that "a few years ago a fox entered in broad daylight the poultry-yard of the parsonage of Sentske, in Westhavelland, and succeeded in killing twenty fowls, and burying nineteen in the neighbouring garden. When the animal was entering the garden with the twentieth, it was observed and took to its heels. On account of its burrow being distant, it had availed itself of so favourable an opportunity of laying in a store near the yard, which for several days and nights running it tried to bring away to a safer place, until it was caught in one of the traps set for it." To this he adds, "I can testify that a fox will even in winter save half a hare towards the night to come. In my youth, one morning after a night during which there had been a moderate fall of snow, I hit upon the track of an old hare accompanied by that of a fox. I followed them into an open field about an English mile, when I came to the spot where the hare had been killed and partly devoured; but observing in the continuation of the fox's track that something had been dragged, I had the curiosity to follow it farther, and at the distance of a few hundred paces found the posterior half of the hare in an excellent condition, buried in the snow under a little bush. I confess the hare was so well carved,

that I had no objection to partaking of Mr. Reynard's fare, preferring at dinner—

‘No doubt,

A rogue with venison, to a saint without.’”

Rabbits, pheasants, and partridges are in some places destroyed in great numbers by the fox; the former indeed are especial favourites as food, and in surprising them the subtle animal displays the most consummate address; besides these, in times of scarcity, field-mice, frogs, and even weasels and polecats, are seized and devoured. Dr. Weissenborn, however, asserts that even the severest hunger cannot compel it to eat the flesh of birds of prey.

Besides animal diet, the fox will feed upon sweet berries, and exhibits a great predilection for grapes: in our island these dainties are not within its reach, but on the Continent it visits the vineyard when the fruit is ripe, and commits considerable mischief. The sweetness of the fruit is no doubt grateful to the animal's palate, and it may be observed that the dog soon becomes very fond of sugar. This partiality for sweets leads the fox occasionally to plunder the bee-hive, as it is asserted, notwithstanding the stings of the enraged inhabitants of the overturned temple of honey-stored cells, from whose annoyance he rids himself by rolling upon the ground, and ultimately secures his prize. For ourselves, we never knew any instance of this kind, though many of the devastation of poultry-yards adjoining to gardens in which were rows of bee hives. We do not deny, however, that instances of this animal plundering the hive may have happened. The kinkajou of South America, the ratel of Africa, and other animals, plunder the nests of the wild bee.

Mr. Daniel (‘Rural Sports’) defends the fox from the accusation of killing lambs, urged against it by the farmer. Mr. Bell, on the contrary, says, “it has been known not unfrequently to carry off a young lamb.” We should certainly say from our own experience that young lambs are very frequently the prey of this sanguinary animal, and that his title of “robber of the fold” is by no means

misapplied. More than once have we heard the farmer's lamentations and vows of vengeance on discovering the palpable proofs of the caitiff's depredation. In Germany, as Dr. Weissenborn assures us, the fox destroys the roe, and even the young of the red-deer. In the forests during the winter the fox, he observes, "fares most abundantly when the snow is from one and a half to two feet deep, and a hard frost succeeding a short thaw has produced an icy crust sufficiently firm to carry the fox, but not the roe." Not only is the swiftness of the former then comparatively much greater, but the roe or young red-deer to which it gives chase soon bleeds at the shins, and falls an easy prey to its pursuer.

The female, upon whom devolves the entire labour of rearing her cubs, breeds in April. She produces from five to eight at a birth, preparing for them a nest at the bottom of her burrow, lining it with dry leaves, moss, and hay. At this period her maternal solicitude is strongly manifested: she employs every artifice to conceal her offspring from discovery, and defends them with indomitable courage; and if she suspect her retreat is discovered, she carries them away one by one to a place of greater safety. A female fox has been known to carry a cub in her mouth during a severe chase of nearly an hour, and only drop it at last from the absolute impossibility of longer retaining her hold compatibly with the freedom of breathing so necessary in her harassing situation. Mr. Daniel ('Rural Sports') has recorded a curious instance in which the female fox departed from her ordinary habits, in order to the more perfect security of her young. In April, 1784, a terrier belonging to the narrator of the circumstance scented a fox to the bottom of a pollard-tree, then up the tree, which the dog vainly made repeated efforts to ascend, till at length the whipper-in, climbing the tree, lifted the dog before him; there in a hole twenty feet from the ground was the fox, with four cubs which had been littered there for safety, and to this hiding-place she must have ascended by the assistance of the roughness of the bark and the boughs alone.

The young ones, or cubs, of the fox are very playful, and, as we have seen puppies do, are fond of endeavouring to catch their own tails, turning round and round in the effort; at about the age of four months they leave the female's protection and shift for themselves. When captured, even at the earliest age, and brought up in confinement, with every kindness, the fox still retains its suspicious character: it may perhaps display some degree of familiarity towards the person who has attended to it and supplied it with food, but it manifests nothing of the gratitude and attachment of the dog, and on the approach of strangers will almost always conceal itself, or, should they attempt to touch it, repel their advances with a bite. To attempt to tame a full-grown fox is useless: it exhibits the utmost impatience of restraint—tries by every means to regain its freedom, and if it cannot succeed, pines, becomes spiritless and dejected, and soon dies. It is essentially an animal “feræ nature,” to which liberty is dearer than life or limb.

Indeed, there are instances well authenticated of foxes caught by the leg in a trap freeing themselves by biting off the confined and perhaps broken member. Dr. Weissenborn cites a case in which a person whom he knew broke one of the fore-legs of a fox with a rifle-bullet, when the animal, being hampered and annoyed by the leg dangling about, turned angrily round and bit it off. He relates other instances, which we will not quote, proving the creature's indomitable resolution and endurance of pain. Mr. Bell adduces the following interesting fact from a correspondent, which shows that, when deprived of a limb, the fox, as if conscious of his condition, departs from his usual method of seeking safety by flight before the hounds:—“I remember once, when out hunting, the hounds found a fox, who did not leave the cover, but kept running from one part of it to another. Just as a hound was about to seize him he jumped over the dog, and thus saved himself. This tedious sport was kept up for a long time, till Reynard, being thoroughly tired with so many leaps and so many enemies, at last fell a prey to them. The huntsman on

taking him up found that he had lost one of his fore-legs. The cover being entirely of furze, and not large, I could see on all sides of him during the hunt, and was much pleased with the many elegant and quick leaps which the poor three-legged fox made to save himself from destruction."

The voice of the fox is a sort of yelp, which, however, it never exerts when watching the movements of its prey, or creeping into the preserve or farmyard. Bewick unhesitatingly asserts from his own observations that the dog and fox will breed together, notwithstanding Buffon's negative. Mr. Bell, who admits that the belief is general, observes that he has in vain endeavoured to trace any valid ground for it. We have often seen sharp-nosed dogs which were called fox-dogs, and have been at the same time assured that they were a cross between the two animals: but on a close investigation we always found that important links in the chain of evidence were wanting; and we have reason to believe that Bewick has based his assertion on nothing more than common hearsay.

It would seem that the fox becomes attached to his old haunt, and that, if caught and removed from it even to a great distance, he has, like the dog, the faculty of tracing the road home. During the time, say Mr. Daniel, that the old Duke of Grafton kept his hounds at Croydon, his Grace's pack were occasionally supplied with foxes from Whittlebury forest: they were sent in the first instance to London, in the venison-cart, and thence were conveyed the next morning to Croydon in a hamper behind the Duke's carriage, when they were immediately turned out before the hounds. A stout fox, conveyed in this manner, was hunted and escaped. Some time afterwards the huntsman suspected that the same animal had been a second time sent from Whittlebury; and to verify the fact, if it happened again, he had him marked previously to his being chased: he escaped. A third time was he taken in his old haunts, and at length fell a victim to the hounds.

In Italy there exists a species of fox (*Canis (vulpes)*)

*melanogaster*) closely allied to the common species. To Dr. Rüppel we are indebted for a knowledge of the *Vulpes famelicus*, the *Vulpes variegatus*, and the *Vulpes pallidus*, natives of Nubia and the adjacent territories.

#### THE EGYPTIAN FOX (*Canis Niloticus*).

In Egypt and Syria there is a species of fox, called Tahaleb by the Copts, Sabora by the Arabs; it is the *Canis Ægyptiacus* of Sonnini; the *Canis Niloticus* of Geoffroy. (Fig. 18.)

It is the size of our common fox, but the ears are



18.—Egyptian Fox.

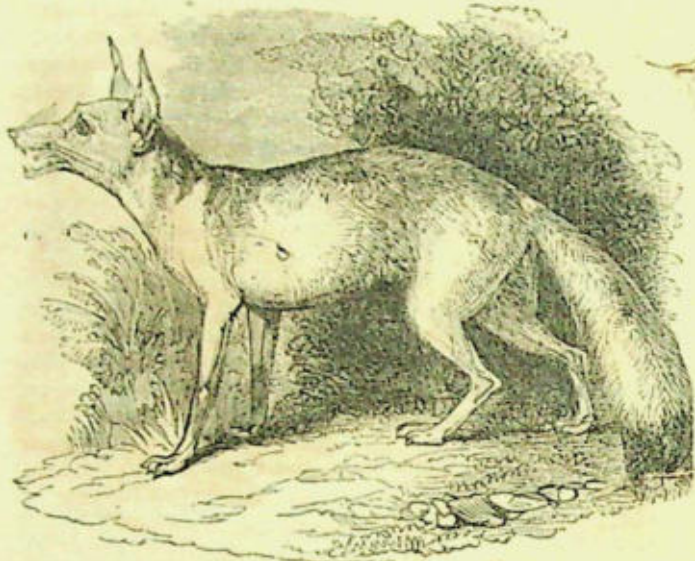
wider apart and longer, and it stands somewhat higher on the limbs. Foxes, apparently of this species, are very abundant in the stony country about Bethlehem, and are also numerous near the convent of St. John in the desert, especially about the vintage time, and are then very destructive in the vineyards, which must be strictly watched in order to prevent their incursions. These animals live in burrows, and have the general habits of the common European fox, to which they are nearly related.

The craft of this animal supplies several Scriptural allusions. Ezekiel (xiii. 4) stigmatizes false prophets as foxes; and our Saviour (Luke xiii. 32) calls Herod a fox, in describing the wily and tortuous policy of that bad man. The fur is used in Syria for common purposes, but the animal is rarely hunted for the sake of his skin.

#### THE CAAMA (*Canis Caama*).

Of the African foxes, which are numerous, we give a specimen of the Caama of the Cape of Good Hope (*Canis (vulpes) Caama*), one of the smallest of its race. (Fig. 19.) A few individuals of this species are to be met with within the limits of the colony, but its favourite residence seems to be more to the northward; though there it is becoming less and less numerous, owing to the skins being much in request among the natives as a covering for the cold season. So important are these skins considered, that many of the Bechuanas are solely employed in hunting the animal down with dogs, or laying snares in the places to which they are known to resort. In common with other foxes this is a great enemy to birds which lay their eggs upon the ground; and its movements in particular are closely watched by the ostrich during the laying season.

When the caama has surmounted all obstacles in procuring eggs, he has to encounter the difficulty of getting at their contents; but even for this difficulty his cunning finds an expedient, that, namely, of pushing them forcibly along the ground, until they come in contact with some



19.—Caama.

substance hard enough to break them, when the contents are speedily disposed of. The natives, from having observed the anxiety of the ostrich to keep this animal from robbing her nest, avail themselves of this solicitude to lure the bird to its destruction; for, seeing that it runs to the nest the instant a fox appears, they fasten a dog near it, and conceal themselves close by, and the ostrich, on approaching to drive away the supposed fox, is frequently shot by the concealed hunter.

Of the Asiatic foxes we may notice the small Indian insectivorous fox (*Canis Bengalensis*), found in Bengal, and also in the Nepál hills: the fox of the Dukhun, called Kokree by the Makrattas (*Canis Kokree*, Sykes), and the hill fox of the Himalayan Mountains (*Canis Himalaicus*), remarkable for the beauty of its fur. It is not uncommon in Doon and in Kumaon. (See 'Proceeds. Zool. Soc.' 1836, p. 103.)



20.—American Red Fox.

## AMERICAN RED FOX

(*Canis fulvus*, var. *decussatus*).

It has been the opinion of many naturalists, and even of Cuvier, that the European fox extends over the northern portion of the American continent; we consider, however, the red fox (*Canis (vulpes) fulvus*) of that portion of the globe to be a distinct species. It differs from its European congener in the same points and degrees as does the wolf of the one country from that of the other. The American fox is in fact to be distinguished by the breadth of its feet, and their consequent capacity for progression on the snow, and by the quantity of long hair clothing the back part of the cheeks, which, in conjunction with the shorter ears and nose, gives the head a more compact appearance. The red fox has a much finer brush than the European, and

is altogether a larger animal. The fur of the body is full, long, soft, and of a bright rufous brown; the skin is therefore valued as an article of trade, and about eight thousand are annually imported into England from the fur countries, where the animal is very abundant, especially in the wooded parts. It is not, however, confined to the colder latitudes; its range, in fact, extends throughout the whole of the United States. In habits and manners the red fox agrees with our common Reynard, but possesses neither the same wind nor the same vigour and power of endurance. (Fig. 20.)

"It runs," says Dr. Richardson, "for about a hundred yards with great swiftness, but its strength is exhausted in the first burst, and it is soon overtaken by a wolf or a mounted huntsman." Foxes of various gradations of colour, termed Cross Foxes, are common in the fur countries of North America. These are considered by Dr. Richardson and most naturalists to be varieties of the red fox, and such is the opinion of the native hunters, than whom none are more likely to possess accurate knowledge on such points. The ordinary cross fox is distinguished by a gray fur mingled with black, which latter colour prevails over the shoulders. A rarer and more valuable variety is the Black or Silver-Fox (*Canis fulvus*, var. *argentatus*). Dr. Richardson states that seldom more than four or five of this variety are taken in a season at one post, though the hunters no sooner find out the haunts of one than they use every art to catch it, because its fur fetches six times the price of any other fur produced in North America. This fox is sometimes found of a rich deep glossy black, the tip of the tail alone being white; in general, however, it is silvered over ("sable silvered"), the end of each of the long hairs of the fur being white, producing a beautiful appearance. A fine specimen is preserved in the Museum of the Zool. Soc.

The Virginian Fox (*Vulpes Virginianus*) appears to be a distinct species, and so most certainly is the Kit, or Tricoloured Fox (*V. cinereo-argentatus*), of which the skins are common in the shops of furriers. This animal

is of small size, and is numerous on the plains extending from the Saskatchewan to the Missouri, and on those of Columbia. It prefers the open country, at a distance from wooded districts, where it dwells in deep burrows of its own excavation, and is extremely vigilant and fleet. Dr. Richardson suggests that it may be regarded as the American representative of the Corsac Fox of the deserts of Tartary, being similar to that species in habits and manners, and frequenting localities of the like character.

### THE ARCTIC FOX

(*Canis (Vulpes) Lagopus*).

Terreanec-arioo of the Esquimaux of Melville Peninsula; Terieniak of the Greenlanders; Wappeeskeeshewmakkeeshew of the Cree Indians; Peszi of the Russians.

In the high northern latitudes of the globe the Arctic fox is the sole representative of its race. Its range extends through Siberia, along the borders of the Arctic Ocean, through the bleak regions of the Esquimaux and the dreary realms of Greenland. (Fig. 21.)

"These foxes," says Dr. Richardson, "inhabit the most northern lands hitherto discovered." In North America their southern limit appears to be about latitude  $50^{\circ}$ . They are numerous on the shores of Hudson's Bay, north of Churchill, and exist also in Behring's Straits. They breed on the sea-coast, and chiefly within the Arctic circle, forming burrows in sandy spots, not solitary, like the red fox, but in little villages, twenty or thirty burrows being constructed adjoining to each other. We saw one of these villages on Point Turnagain, in lat.  $68\frac{1}{2}^{\circ}$ . Towards the middle of winter they retire southwards, evidently in search of food; keeping as much as possible on the coast, and going much farther to the south in the districts where the coast-line is in the direction of their march. Captain Parry relates that the Arctic foxes, which were previously numerous, began to retire from Melville Peninsula in November, and that by January few remained. Towards the centre of the continent, in lat.  $65^{\circ}$ , they were seen only in the winter,



21.—Arctic Fox.

and then not in numbers. They are very scarce in lat.  $61^{\circ}$ , and in lat.  $53^{\circ}$  two only were seen in forty years! "Herne says that when taken young the Arctic fox may be domesticated in some degree, but he never saw one that was fond of being caressed." Though not destitute of intelligence, the Arctic fox, unlike the common fox, is unsuspecting and destitute of caution: it has been known to stand by while the hunter was preparing a trap, and on his retiring to run headlong into it. Captain Lyon received fifteen from a single trap in four hours. The voice of this species is a kind of yelp, and, when a man approaches their breeding-places, they put their heads out of their burrows and bark at him, allowing him to come within range of shot. They appear to have the

power of decoying other animals within their reach by imitating their voices.

"While tenting," says Captain Lyon, "we observed a fox prowling on a hill side, and heard him for several hours afterwards in different places imitating the voice of a brent-geese." Eggs, young birds, blubber, and carrion of any kind, constitute the food of this fox—especially different species of lemmings, which are greedily devoured. In general form the Arctic fox resembles the European species, but is considerably smaller, and, owing to the great quantity of white woolly fur with which it is covered, is somewhat like a little shock-dog. The brush is large and full, affording an admirable covering for the nose and feet, to which it acts as a muff when the animal sleeps. Although the head is not so pointed as in our English species, yet it has that air of slyness which is so characteristic of all foxes. The eyes are clear and bright, and of a hazel colour.

Captain Lyon remarks that the muzzle of the female is shorter than that of the male, and has less of cunning and more of mildness in its expression. The ears are short and thickly covered with hair, and their edges appear as if they had been cropped. The cheeks are ornamented by a projecting ruff, which extends from behind the ears quite round the lower part of the face, to which it gives an agreeable appearance. The legs are rather long than otherwise, and show great strength of muscle. The feet, which are large, are armed with strong claws. "When the animal is standing still, the hind legs are so placed as to give the idea of weakness in the loins, which is certainly not the case, as few animals can make more powerful leaps. The general weight is about eight pounds, although some were found to be as low as seven, and a few as high as nine pounds and a half when in good case."

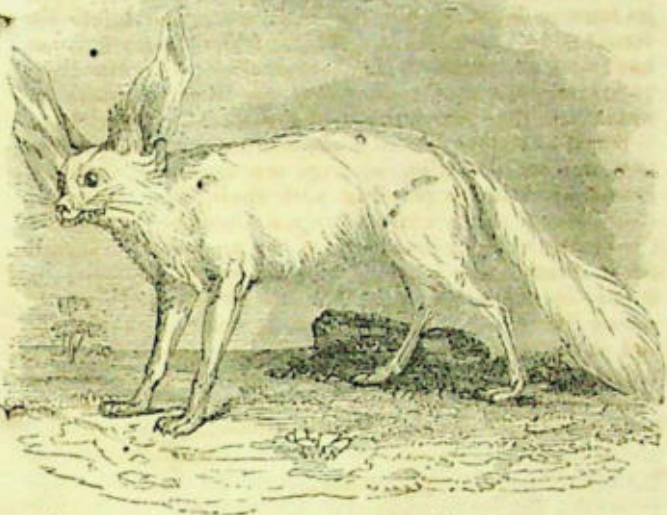
The Arctic fox is cleanly, and free from any unpleasant smell: it is habitually watchful, and, when asleep, opens its eyes at the slightest noise near it. Day is its season of rest: during the night its activity is extreme, and it gambols or hunts for food till daybreak. While

in pursuit of its prey it is mute, but in captivity, or when irritated, it utters a short sharp bark. When first taken its rage is ungovernable, nor is it ever thoroughly reconciled to confinement. Those which Captain Lyon had were observed to hide their food, like the dog, under lumps of snow; snow also was their substitute for water, and they would roll in it with evident satisfaction. "When the snow was slightly scattered on the decks, they did not lick it up, as dogs are accustomed to do, but, by repeatedly pressing with their nose, collected small lumps at its extremity, and then drew it up into the mouth with the assistance of the tongue." Though a few Arctic foxes remain white during the summer, it is only in the winter that the majority assume this pure snowy livery, accompanied by an increase in the fulness and thickness of the fur, which deeply covers even the soles of the feet. In summer the fur is thinner, and of a dusky brownish ash or leaden tint; and the callous pads of the toes become partially visible.

### THE FENNEC

(*Megalotis Fennecus*). *Canis Zerda*, Zimmerman; *Megalotis Cerdo*, Illiger; *Fennicus Cerdo*, Lacépède; *Viverra aurita*, Blumenbach; *Fennec* of the Arabs, Bruce.

For our first knowledge of this elegant little animal we are indebted to the celebrated Abyssinian traveller Bruce, who discovered it in Nubia. So little, however, was its true character understood, that in the third volume of the Supplement to Buffon's work it is termed "animal anonyme," and even M. Geoffroy for some time regarded it as identical with the Senegal Galago; in fact, the French naturalists were disposed to sink the fennec as a new species of *canis* altogether. Colonel Denham, however, recognised the animal in the interior of North Africa, and accurately figured it in the Zoological Appendix to his Travels: he also brought a specimen to this country, and thus established the truth of Bruce's description. Rüppel rediscovered it in Nubia, where



22.—Fennec.

Bruce had first seen it. (Fig. 22.) A preserved specimen and a perfect skeleton, both in excellent preservation, are among the riches of the Museum of the Zoological Society. A detailed account of the osteology of this animal, drawn up by Mr. Yarrell from this skeleton, will be found in the third volume of the 'Zoological Journal.' Whoever examines the skeleton of the fennec will not hesitate for a moment as to the place in nature which the animal occupies. The skull, the teeth, the feet, declare it at once to belong to the Canine group. The fennec frequents the sandy desert tracts of Nubia, and other districts of northern Africa, dwelling in burrows of its own excavation. It is said to live much on the fruit of the date, and to climb trees in order to obtain its food; this fact, if true, is very remarkable, being a marked departure from the habits and manners of the rest of the present family. Bruce, indeed, says that it builds its

nest in trees, and does not burrow in the earth; but this statement is contradicted by M. Rüppel. The individual which Bruce had in his possession while at Algiers was fond of dates or any sweet fruit, and was also partial to eggs. He would eat bread when hungry, especially if sweetened with honey or sugar. The sight of a bird aroused him to eager watchfulness as long as it was present, and a cat was his aversion. He would endeavour to hide from the latter, and never showed a disposition to resist or defend himself. The animal was disposed to sleep by day, but as night came on became restless to excess. It was never heard to utter any sound.

The fennec is small and slightly made, with slender limbs. The length of the head and body is about thirteen inches, that of the tail eight; the head is narrow, the muzzle pointed; the pupil of the eye large and black, the iris deep blue; whiskers long and thick. The ears are extremely large, as long as the head, broad at the base, erect and pointed. The fur of the body is rather short, but full and silky. The colour is uniform pale fawn or cream-colour, passing into white beneath; the inside of the ear is fringed with long white hairs; the whiskers are white. In the districts of Benni Mezzab and Werglah, where the date grows, the fennecs are hunted for their skins, for which, according to Bruce, there is a market at Mecca, whence they are exported to India.

In the sub-genus *Megalotis*, Cuvier associates with the fennec a species from South Africa, the *Canis Megalotis* of De Lalande (*Megalotis Lalandii*, H. Smith). This animal is somewhat less than the common fox, but comparatively higher on the limbs; its general colour is yellowish gray, but the feet and tail, together with a stripe down the spine, are black; the ears are large and spreading.

#### THE CAPE HUNTING-DOG

(*Lycan tricolor*, Brookes). *Canis pictus*, Desmarest; *Hyana venatica*, Burchell.

This daring and ferocious animal, one of the pests of southern Africa, is a complete dog, or canis, in the form

of the skull and the characters of the teeth; it has, however, as in the hyænas, only four toes on the anterior feet, and the same on the feet behind. In figure it is tall, lightly built, but muscular and well proportioned; the limbs are long, the ears large and erect, the jaws powerful, and the teeth strong. Its aspect is wild and fierce, and its disposition treacherous. The fur is close and of a sandy yellow, irregularly clouded and blotched with black and a little white. The tail is somewhat bushy and of moderate length. The colour is subject to variation. (Fig. 23.)



23.—Cape Hunting-Dog.

Wild, fleet, and savage, this species hunts in packs, mostly during the night, but frequently in the day; and so fleet is it, that few animals can escape. It often commits extensive ravages on the flocks and herds of the farmer, though it seldom attacks horned cattle openly, but steals on them while asleep, and bites off their tails, even at the root, with one snap, a feat which the wide

gape and vast power of its jaws enables it to do with ease. Mr. Burchell, on his return from Africa, brought a living individual to England, which retained during life all its native ferocity. The preserved skin is in the museum of the Zoological Society. A specimen in the Tower some years since arrived in company with a young Cape lion, both occupying the same den, till the lion became too strong and rough in his play, when the hunting-dog was associated with a striped hyæna and two of the spotted species, with which it agreed tolerably well.

It is generally the opinion of naturalists that this species, for which the celebrated anatomist, the late Joshua Brookes, Esq., founded the genus *Lycæon*, is an intermediate link in the chain of the Carnivora, uniting the canine group to the hyænas; indeed, in some points of general aspect, and in the number of the toes, the approximation of this dog to the latter animals is so marked, that Mr. Burchell regarded it as a hyæna, and as such Temminck described it under the title of *Hyæna picta*, though he afterwards assigned it to the genus *Canis*. The name of Hyæna-dog has also been conferred upon it, but, as Mr. Swainson gives this title to the Aard-wolf (*Proteles*), we drop it altogether for the sake of avoiding confusion or misapprehension.

In size the Cape hunting-dog (Wilde Honden of the Dutch colonists) is as large as a pointer or hound, but higher on the limbs in proportion to the bulk of the body. We are not aware that any serious attempts have been made to domesticate it.

#### FAMILY—VIVERRIDÆ.

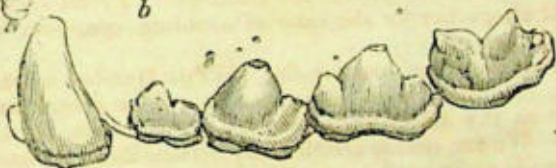
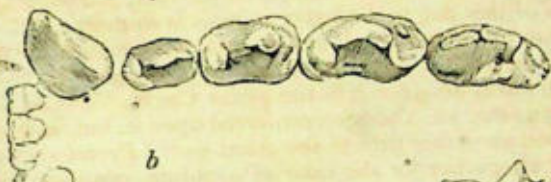
We are led from the Canine family through the *Lycæon*, or Hunting-dog of the Cape, to the true Hyænas, which form a section of the family *Viverridæ*, comprising the Civets, the Genets, the Ichneumons, and the Paradoxures. Destined for a life of rapine, the *Viverridæ* are active and vigorous: in general, the body is rather elongated, the head somewhat conical, the muzzle often acute, the eyes oblique, and the tongue



a



b



c



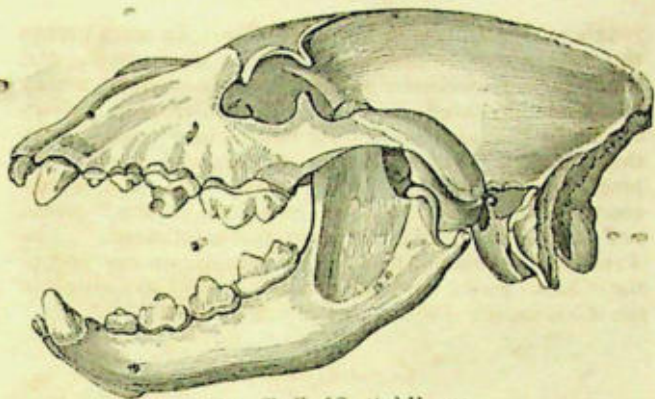
24.—Teeth of Hyena.

rough, with retroverted horny papillæ. In most groups the feet are digitigrade; in some, semi-plantigrade. Many are remarkable for a strongly-scented musky secretion, prepared in certain glandular sacs. Nocturnal or crepuscular in their habits, they emerge from their retreats with the close of day, and begin their prowl in quest of food. Of restless, wild, and savage temper, they are by no means destitute of intelligence, and are even capable of being domesticated. The *Viverridæ* approach, through the hyæna, on one part to the Canine race; they are through other links allied to the *Ursidæ*, the *Felidæ*, and the *Mustelidæ*.

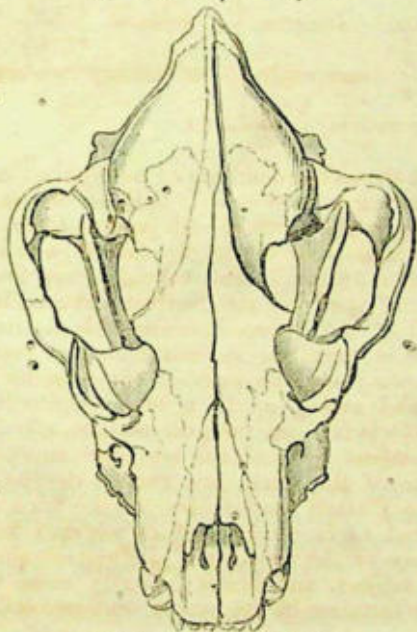
Genus *Hyæna*.

Dentition:—Incisors,  $\frac{6}{6}$ ; canines,  $\frac{1-1}{1-1}$ ; false molars,  $\frac{3-3}{3-3}$ ; carnassières, or laniary molars,  $\frac{1-1}{1-1}$ ; tubercular molars,  $\frac{1-1}{0-0} = 34$ .

Fig. 24 shows the dentition of the hyæna: *a*, teeth of the upper jaw in two views; *b*, those of the lower in two views; *c*, the teeth of both jaws together. Fig. 25 represents the skull of the Spotted Hyæna in profile; fig. 26, the skull of the same animal viewed from above; fig. 27, the skull of the Striped Hyæna in profile. The skull of the hyæna is remarkable for its solidity; the muzzle is short; the zygomatic arch of vast strength and thickness; and the sides of the cranium are compressed, and sweep up to a high longitudinal ridge, which projects far back from the occiput, affording space for an immense mass of the temporal muscles, which, with those of the neck, are greatly developed. According to Cuvier, the vertebræ of the neck are sometimes found to be anchylosed, or soldered together, in consequence of the violent and continual strain to which they are subject, and hence probably arose the belief that these vertebræ in the hyæna were one solid piece.



25.—Skull of Spotted Hyæna.



26.—Skull of Spotted Hyæna.

In the port and figure of the hyæna there is something very remarkable. The neck, chest, and shoulders are amazingly robust, but the hind quarters are low, from the crouching posture of the hind legs, which may be termed knock-kneed, the heel-joints approaching each other. The movements of these limbs are of a dragging character, influencing the pace of the animal, which, though rapid, is a sort of awkward shuffle. The toes are four on each foot, furnished with blunt, stout, unretractile claws. The ears are large and erect; a full mane runs down the spine; there is a deep glandular subcaudal pouch; the pupil is somewhat oblong; the tongue rough; the habits are nocturnal.



27.—Skull of Striped Hyæna.

The hyænas were not separated by Linnæus from the genus *Canis*, but subsequent naturalists have placed them in various groups according to their views of affinity. We believe them to form a group of the *Viverrida*.

Three distinct species are known.



28.—Striped Hyæna.

## THE STRIPED HYÆNA

(*Hyæna vulgaris*, Desm.). *Hyæna striata*, Zimmerman; *H. orientalis*, Tiedem.; *H. antiquorum*, Temm.; *Canis Hyæna*, Linn.

This species is a native of Asia, and of northern and central Africa. (Fig. 28.) It is found in the Caucasian and Altaic mountains, in Asiatic Turkey, in Syria, Turkey, Persia, India; and in Barbary, Arabia, Egypt, Nubia, Abyssinia, Soudan, Senegambia, &c.

We may here premise, that much of what relates to the striped hyæna, so extensively spread, applies equally to the other species, which appear to be confined exclusively to South Africa. They are all destined to fill an important station in the economy of nature. It is their part, with vultures and other foul-feeding creatures, to cleanse the earth of putrescent animal matters, and

especially of the decaying carcasses of the larger beasts, whose remains, if not speedily removed, would infect the atmosphere with pestilential effluvia. They are Nature's scavengers, and assiduously do they labour in their vocation: they clear the battle-field of the victims of barbarous warfare, gorging on the bodies of the slain; they disinter the dead from the lightly-covered grave; they ransack towns and villages in search of offal; they prowl about the fields, and around the enclosures of human dwellings. The carrion which chance throws in their way furnishes a luxurious meal, nor are the strongest bones unacceptable—such is the power of their jaws, that they crunch the thigh-bone of an ox, for the sake of the marrow it encloses.

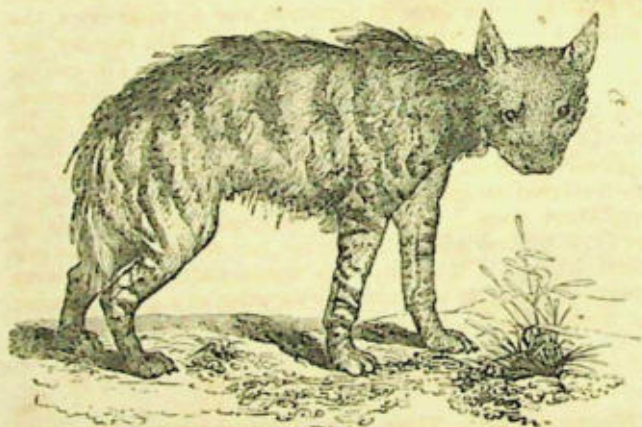
Carrion and dead bodies, however, are not their only food; they prey upon horses, sheep, and cattle, often committing extensive depredations; nor are human beings safe from their murderous assaults. They seldom, indeed, attack man openly, and usually avoid a contest with him; but, when driven to self-defence, they turn furiously upon their assailant, and combat with determined obstinacy. On the contrary, the sleeping man, woman, or child, whom they chance to discover in their nightly prowl, almost certainly falls a victim. Their haunts by day are dens and caves, gloomy rocks, and the ruins of towns and sepulchral monuments of antiquity; there the "fell hyæna" rears her brood. As darkness sets in, these fierce beasts emerge from their lair, and, menacing with teeth displayed and glaring eyes, warn the intruder to a timely retreat.

In some districts the striped hyæna is fearfully numerous. Bruce records that in Abyssinia they were the scourge of the country "both in the city and the field, and appeared to surpass the sheep in number. From evening till dawn of day the town of Gondar was full of them: here they sought the different pieces of slaughtered carcasses which were exposed in the streets without burial. Many a time in the night, when kept late in the palace, on going across the square from the king's house, I have been apprehensive lest they should

bite me in the leg. They grunted in great numbers around me, although I was surrounded by several armed men, who seldom passed a night without wounding or slaughtering some of them. One night I went out of my tent, and returning immediately, I perceived two blue eyes glaring at me in the dark; I called my servant to bring a light, and we found a hyæna standing near the head of the bed, with two or three large bunches of candles in his mouth, by keeping which, he seemed to wish at that time no other prey. I was not afraid of him, but with a pike struck as near the heart as I could. It was not until I had done this, that he showed any signs of fierceness; but upon feeling his wound he dropped the candles and endeavoured to run upon the shaft of the spear to arrive at me; so that I was obliged to draw a pistol from my girdle and shoot him, and nearly at the same time my servant cleft his skull with a battle-axe. In a word, the hyænas were the plague of our lives, the terror of our midnight walks, and the destruction of our mules and asses, which are their favourite food." Major Denham gives a similar account. At Kauka, he says, the hyænas are "everywhere in legions, and grew now so extremely ravenous, that a good large village where I sometimes procured a draught of sour milk on my duck-shooting excursions had been attacked the night before my last visit, and the town absolutely carried by storm, notwithstanding defences, of nearly six feet high, of branches of the prickly trilloh, and two donkeys, whose flesh these animals are particularly fond of, carried off in spite of the efforts of the people."

Few animals have been the subjects of more false and superstitious opinions, both in ancient and modern times, than the hyæna. Among the writers of antiquity, however, Aristotle accurately describes it, and even explains the popular error current in his day, as it has been since, respecting the bi-sexual character of the animal; an error in which Pliny seems to acquiesce, though he alludes to Aristotle's contradiction of it; but it is evident that he knew nothing himself of the true history of the animal, for, as Cuvier has observed, the Romans were not really

acquainted with the animal till at a comparatively late period. Gordian III. is the first, and apparently the only one, of the emperors who imported it; he had ten which were exhibited in the games of Philip, in the year of Rome 1000, or A.D. 247. It is not, in fact, until within the last few years, comparatively speaking, that the moderns have recognised the true hyæna. Belon, who wrote in 1553-4-5, &c., mistook the civet for it, which animal indeed resembles the hyæna in having scent-pouches, a mane, and a transversely barred or waved style of colouring; yet at the same time that he fell into this error, he was in possession of a good figure of the true hyæna, but, without suspecting the real fact, he gives this under the title of Sea-Wolf, and describes it as an animal from the coasts of England. From the time of Belon to that of Buffon, no naturalist figured the hyæna from nature; and it is only within the last few years that its real character has been understood. (Fig. 29.)



29.—Stippled Hyæna.

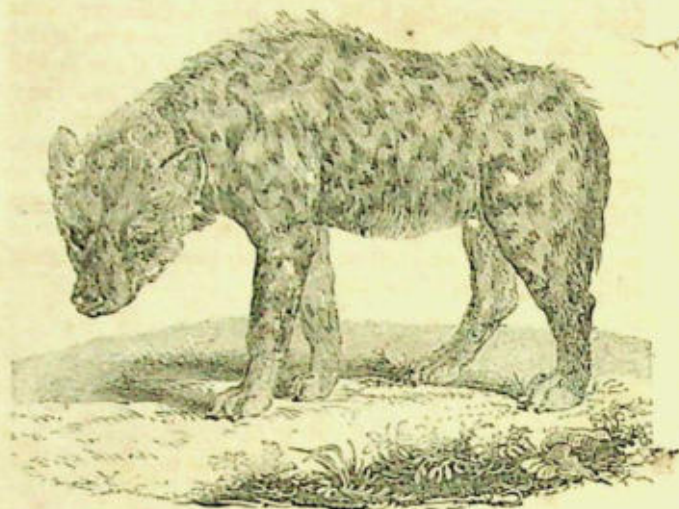
The hyæna has been represented as ferociously untameable; nothing can be more untrue; it is easily domesticated. Bishop Heber saw one in India that followed

its master and fawned on him like a dog. Barrow, speaking of the South African Spotted Hyæna, states that in the district of Schneuberg it is domesticated, and used like a hound for the chase. Colonel Sykes kept a young hyæna tame in India, and brought the animal over to England; he presented it (then full grown, yet gentle as a dog) to the Zoological Society. "In India," says Colonel Sykes, "it was allowed to run about my house, and on board ship it was released from its cage two or three times a day, to play with the sailors and gambol with the dogs. It early recognised my person and voice, would obey when called, and in general was as playful and good-humoured as a puppy. My visits to it in the Gardens have been rare and at long intervals, nor have I ever carried it food. I anticipated, therefore, that it would outgrow its early affection, and that I should be to it as any other stranger; but it has always greeted me not only as an old acquaintance, but as an old friend; and if I am to judge from its agitation and peculiar cries, the animal's recognition is that of affection. On Sunday last it was asleep in its cage when I approached. On calling it by its name it looked up, distinguished me in the crowd, started on its legs, and on my applying my hand to its mouth to smell to, it threw itself down against the bars, rubbed its head, neck, and back against my hand, and then started on its legs, and bounded about its cage uttering short cries. On ceasing to speak to it and moving away, it looked wistfully after me, nor resumed its motions till I addressed it again. Its manifestations of joy were so unequivocal as to excite the surprise of a great number of bystanders." ('Zool. Proceeds.,' 1833, p. 76.)

### THE SPOTTED HYÆNA

(*Hyæna crocuta*). Tiger-Wolf of the colonists at the Cape;  
*Hyæna Capensis*, Desm.; *H. maculata*, Thunberg.

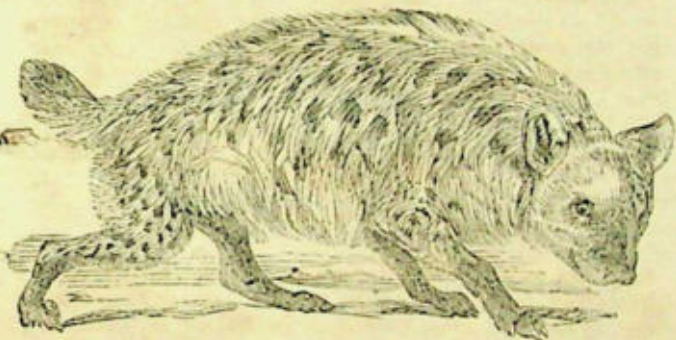
This species (Fig. 30) is the nuisance and even terror of South Africa, where it is well known to the farmers, who too often experience the effects of its destructive habits;



30.—Spotted Hyæna.

for it not only devours the carrion which chance throws in its way, but it invades the farmers' pens or folds during the night, and often succeeds in killing or mutilating such of the larger kinds of live stock as have not been secured before dusk. Sickly animals, as we are assured, are less liable to suffer from the voracity of this creature than those which are in full health: the latter by their rapid flight inspiring the enemy with a courage of which by nature he is destitute; whereas the sickly face him, and thus intimidate him. So anxious is he for the flight of animals as a preliminary to his attack, that he uses all the grimace and threatening he can command, to induce them to run, and never dares to attack them unless they do so. The spotted hyæna seldom moves abroad during the day; night is his season of activity, and towards nightfall his howlings are regularly heard, announcing to the various animals that their foe is on his prowl. (Fig. 31.) These dismal sounds appal the timid; and as

they are heard on every side around, confuse the affrighted fugitive, who often runs into the danger from which he seeks to escape. Formerly hyænas were in the habit of paying nightly visits to the streets of Cape Town, and even now occasionally approach the town, and their howlings are often heard from the Table Mountain. In the Caffre country they are numerous and daring, approaching the villages, and attempting, either by force or stratagem, to pass the wattles by which the houses are defended. If so far successful, they next attempt to enter the houses, and not unfrequently succeed in carrying off a young child of the family.



31.—Spotted Hyæna.

Mr. Steedman, in his 'Wanderings and Adventures in the Interior of Southern Africa,' gives most appalling accounts of the rapacity of the spotted hyæna. He states that Mr. Shepstone, in a letter from Mamboland, relates that the nightly attacks of wolves, as the hyænas are generally called, have been very destructive amongst the children and youth; for within a few months not fewer than forty instances came to his knowledge wherein that beast had made a most dreadful havoc. "To show clearly," says that gentleman, "the preference of the wolf (spotted hyæna) for human flesh, it will be necessary to notice that when the Mambookies build their houses,

which are in form like beehives, and tolerably large, often eighteen or twenty feet in diameter, the floor is raised at the higher or back part of the house, until within three or four feet of the front, where it suddenly terminates, leaving an area from thence to the wall, in which every night the calves are tied to protect them from the storms or wild beasts. Now it would be natural to suppose, that should the wolf enter, he would seize the first object for his prey, especially as the natives always lie with the fire at their feet; but, notwithstanding this, the constant practice of this animal has been in every instance to pass by the calves in the area, and even by the fire, and take the children from under the mother's kaross, and this in such a gentle and cautious manner, that the poor parent has been unconscious of her loss until the cries of her little innocent have reached her from without, when a close prisoner in the jaws of the monster." Mr. Shepstone then particularises two instances within his own knowledge, one of a boy about ten years of age, and the other of a girl about eight, who had been carried off by this species, and wretchedly mangled, but recovered by the attention of Mr. Shepstone and his friends.

Various methods are employed for the destruction of this ferocious beast, as snares, pit-falls, traps, spring-guns, &c., but so cunning and suspicious is the animal, that he mostly avoids them.

The general colour of this species is yellowish-brown, with numerous spots, more or less distinct, of a deeper tint. The mane down the neck and back is less full and long than in the striped hyæna, and the hair generally shorter.

#### THE VILLOSE HYÆNA

(*Hyæna villosa*, Smith). Straand-Wolf of the Dutch colonists of the Cape.

For our knowledge of this species, which resembles in some respects the Striped Hyæna, we are indebted to Dr. A. Smith, who figured and described it in the



32.—Villose Hyæna.

fifteenth volume of the 'Linnean Transactions.' (Fig. 32.) The Villose Hyæna is a native of South Africa, but is by no means so common as the spotted species, and is found chiefly along the sea-coast, but has been observed in the neighbourhood of Nieuveld Mountains, a considerable distance in the interior of the country. The Villose Hyæna, or Straand-Wolf, devours carrion, and such dead animal substances (whales for instance) as the sea casts up; but when pressed by hunger its habits seem to resemble those of the other species, for it then commits serious depredations on the flocks and herds of the colonists, who hold its incursions in great dread. Mr. Steedman, who states this, says that he saw a very fine specimen, which had been shot by a farmer residing in the vicinity of Blauwberg, and was informed that it had destroyed three large calves belonging to the farmer. He adds, that it is said to be a remarkably cunning ani-

mal, retiring to a considerable distance from the scene of its depredations to elude pursuit, and concealing itself during the day-time in the mountains, or in the thick bush which extends in large patches throughout the sandy district in which it is usually found.

The Villose Hyæna stands about two feet four inches in height at the shoulder, and measures four feet four inches from the nose to the root of the tail. The hair of the body is long and coarse. Its general colour is dusky-gray, variegated with indefinite clouds or oblique bands of black, the latter prevailing on the limbs.

The fossil-bones of extinct species of hyæna prove the abundance of these animals at one period in our portion of the globe. In the Cave of Kirkdale these relics were found in vast numbers, exceeding those of any other carnivorous animal. They have been discovered also in other places in our island. On the Continent they occur in the Cavern of Gaylenreuth, and in most of those where the fossil-bones of bears are met with, to which we have already alluded.

### THE PROTELES

(*Proteles cristata*). Aard-Wolf (earth-wolf) of the Dutch colonists of the Cape; *Proteles Lalandii*, Isidore, Geoffroy; *Viverra Hyænoïdes*, Desmarest; *Civette Hyænoïde* of F. Cuvier.

The genus *Proteles*, which appears to link the Hyænas to the Civets, contains, as far as known, only one species, which is a native of South Africa. In general contour and manners this singular animal much resembles the former animals, but is of inferior size. The hinder quarters are low and trailing; the shoulders thick and muscular; while a full coarse mane runs along the spine. (Fig. 33.) In dentition it is very remarkable. The molars are  $\frac{4-4}{3-3}$ , much separated from each other. Of those above, the first three are false, and the fourth is small and tuberculous, with three points. The three

molars below have each the character of false molars. Incisors and canines as usual.

On their fore-feet there are five toes, but the thumb is short, rudimentary, and high on the carpus, as in the dog; the hinder-feet have four toes. The claws are strong, large, blunt, and well adapted for scratching. There are no decided scent-pouches, as in the Civets, but a furrow in their stead. The form of the head more resembles that of the Civets than the Hyænas, being somewhat elongated, and having the muzzle conical and pointed. The ears are long, erect, acute, and thinly covered with



33.—Proteles, or Aard-Wolf.

hair; the whiskers are strong: the tail is short and bushy, with coarse hair. The body is covered with woolly fur, intermixed with long coarse hairs. The general colour is of a yellowish-gray, radiated with distinct transverse stripes of dusky-black, the mane being waved with black, which is also the colour of the feet and extreme half of the tail. The young are much darker, both in general colour and their markings, than adults. Length of an adult female specimen in the Museum of the Zoological

Society, two feet six inches, exclusive of the tail, which is eleven inches. The male is somewhat larger.

The Aard-Wolf, or *Proteles*, is nocturnal in its habits, and constructs a deep burrow, at the bottom of which it lies concealed during the day-time. This subterranean chamber, to which there are three or four different entrances, is usually occupied by several individuals, so that the animal appears to be partially gregarious. Notwithstanding the trailing contour of its hind-quarters, it runs with considerable quickness; when irritated, it erects its mane, like the hyæna. Its food consists of carrion and small animals, not excluding ants, which were found by Sparrman in the stomach of one he killed.

#### THE CIVET (*Viverra Civetta*).

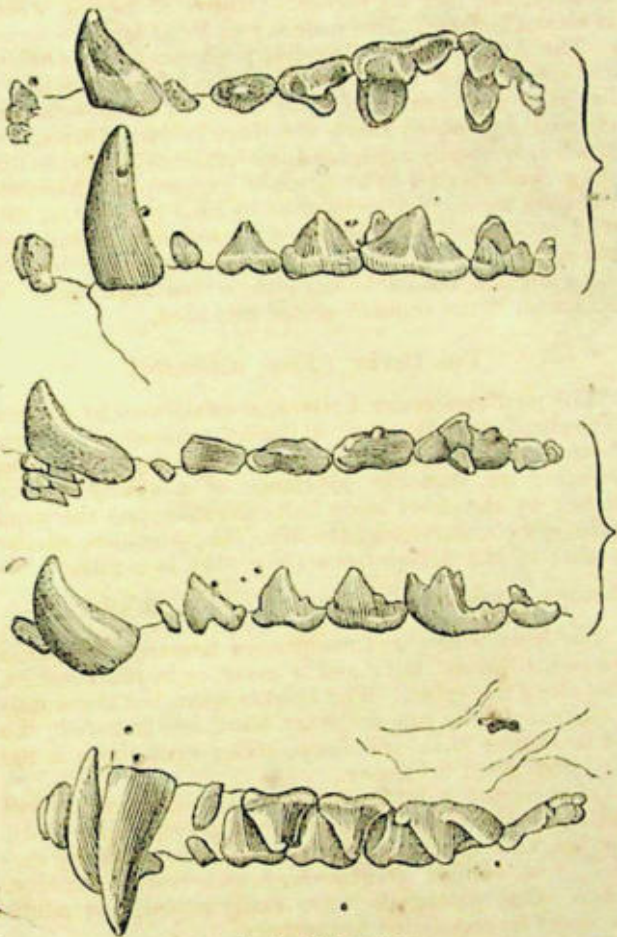
The restricted genus *Viverra*, as established by modern naturalists, contains only a limited number of species, characterized by the possession of a large double sacculus, secreting an unctuous substance of a strong musky odour; by the claws being half-retractile; and the pupil of the eye circular during the day. The dentition, similar to that of the *Ichneumons* (Fig. 34), is as follows:—

Incisors,  $\frac{6}{6}$ ; canines,  $\frac{1-1}{1-1}$ ; molars,  $\frac{6-6}{6-6}$ , = 40.

The body is long and compressed laterally; the fur is somewhat harsh, full; and a mane, as in the *Proteles*, runs along the spine. The head is stout, but the muzzle is elongated, the ears are short, wide, and rounded; the tail is shorter than the body. The eyes gleam in the dark with great brilliancy.

Of nocturnal habits, wild and savage, the animals of this genus are decidedly carnivorous, preying upon birds, reptiles, and small mammalia, which they take by surprise, and exhibit great energy and bodily activity. When taken young they are easily tamed, but adults can never be reconciled to captivity.

The Civet is peculiar to North Africa, and is especially common in Abyssinia, frequenting hilly uncultivated districts and arid situations. It gives its name to the musky



34.—Teeth of Ichneumon.



35.—Civet.



36.—Civets.

perfume for which all the species are equally remarkable. In figure the civet is robust, but the body is compressed laterally; in size it equals a dog of middle stature, being about twenty-six inches in length, exclusive of the tail, which is thirteen or fourteen inches. (Fig. 35.) Buffon states that in his time numbers were kept in Holland for the commercial advantage of obtaining their odorous secretion; but we are not aware that such is now the case. In North Africa, however, the practice is in vogue. The colour of the civet is dark gray, thickly banded with black; a white stripe runs along the sides of the neck, bounded by a black line above, the throat and sides of the muzzle being black. A thick mane of coarse black hair runs along the neck and back, and continues over the tail, which is consequently somewhat bushy. (Fig. 36.)

In India the Civet is represented by the Zibet (*Viverra Zibetha*, Linn.; *Viverra undulata*, Gray), and in Java by the Tungalung (the Tungalunga Padi of the natives). This is the Spotted Civet, *Viverra Tungalunga* of Gray, and the *V. Zibetha* of F. Cuvier, Dr. Horsfield, Sir T. Raffles, who confounded it with the former, from which it is decidedly distinct. It is the *Viverra Hardwickii* of Lesson.

#### THE GENET (*Genetta vulgaris*).

The Genets are distinguished by a slim and graceful contour; the neck is long; the head is narrow, and terminates in a pointed muzzle; the limbs are short; the ears broad, short, and rounded; the tail lengthened, the pupils of the eyes linear and vertical; the musk-pouches are inconsiderable or reduced to a mere depression. (Fig. 37.)

In their manners, as well as in several anatomical peculiarities, the Genets approximate closely to the Cats. Like those animals, they hiss when approached or irritated; spring upon their prey, taking it by surprise; strike and lacerate with their talons, which are completely retractile; and climb trees with ease and rapidity. In the markings and character of the fur also we see a marked approach to the cats.



37.—Genet.

The Common Genet is found throughout Africa, and occurs in the South of France and other portions of Europe adjacent to the Mediterranean. It is said to haunt the borders of streams and rivers, especially near their source. (Fig. 38.) This beautiful but fierce animal is easily domesticated, and is kept tame in Constantinople, where it is in repute as a destroyer of rats and mice. Its odour is not very powerful, nor at all disagreeable.

The general colour is grayish-yellow, with black lines down the back, and spotted on the sides with the same; on the cheeks, above the eyes, and on each side of the muzzle, there is a streak of white; the tail is alternately banded with black and white.

#### THE RASSE GENET (*Genetta Rasse*).

*Viverra Rasse*, Horsfield; *Viverra Gunda*, Hamilton, MSS.

This species, which is a native of Java, appears to be a different one from the *Genetta Indica*. According



38.—Genet.



39.—Rasse Genet.

to Dr. Horsfield, it frequents forests of moderate elevation, where it preys upon small birds and animals of every description, and possesses the sanguinary appetite of the animals of this family in a high degree. (Fig. 39.) In confinement it will devour a mixed diet, and is fed on eggs, fish, flesh, and rice. The natives affirm that salt is a poison to it. Its odoriferous secretion is termed *dedes* by the Javanese, and *jibet* by the Malays, and is held in high esteem. In the Museum of the Zool. Soc. there are eight distinct species of the present genus, to which has yet to be added the *Fossane* of Madagascar.

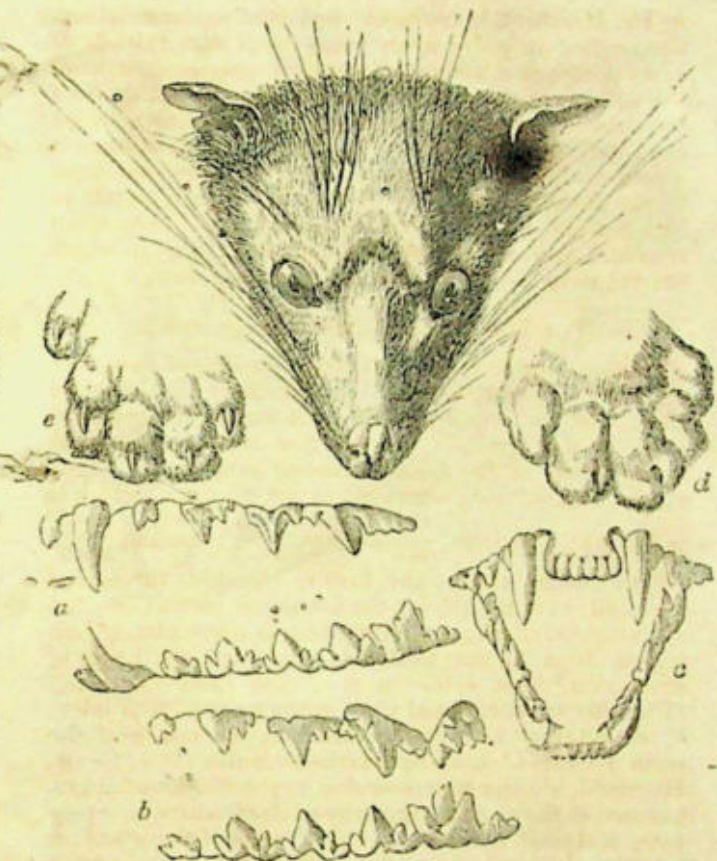
#### THE DELUNDUNG (*Prionodon gracilis*).

This beautiful and singular species, a native of Java, was regarded by Dr. Horsfield as so intimately related to the Cats, that he terms it *Felis*, and assigns it a sectional place in that group. We consider it to be the most nearly allied to the Genets, though destitute of scent-glands, and differing somewhat in the dentition, which is

as follows:—Incisors,  $\frac{6}{6}$ ; canines,  $\frac{1-1}{1-1}$ ; molars,  $\frac{5-5}{6-6}$ .

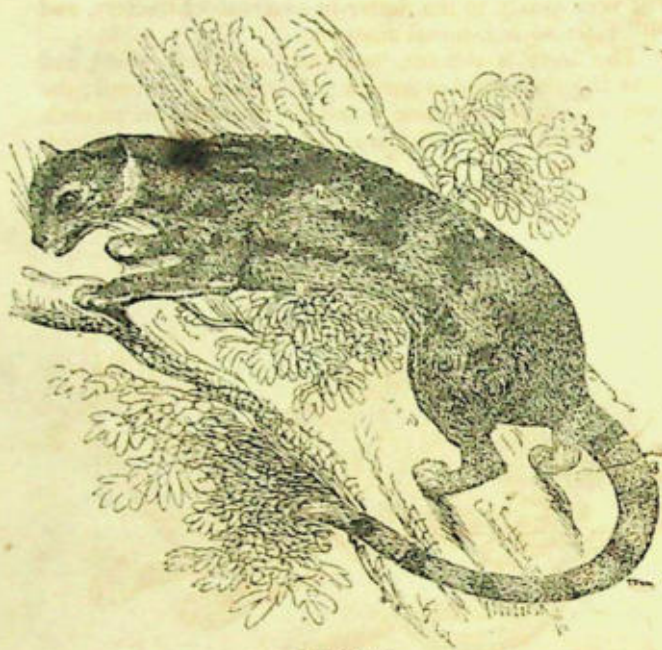
Of the molars above, the first is bicuspid, the second tricuspid, as is the third; the fourth, or carnassière, has an elongated cutting edge; the fifth is tubercular. This jagged form of the teeth has suggested the name of *Prionodon*, from *πρίων* 'a saw,' and *ὀδὸς* 'a tooth.' (Fig. 40: *a*, an external view of the teeth of both jaws; *b*, an internal view of the same; *c*, front view of the teeth.) The *Delundung* was discovered in 1806, by Dr. Horsfield, during his researches in the district of Blambangan, at the eastern extremity of Java, where it is very rare, and still more so in other parts of the island: it inhabits the extensive forests with which the district is almost entirely covered. Of its habits no details were collected. (Fig. 41.)

This animal is extremely slender and elongated, with a tapering head and sharp muzzle, a long thick tail, and slender delicate limbs. The eyes are sprightly, the irides brown, the pupils circular. The claws are minute



40.—Head, Teeth, and Feet of Delundung.

and sharp, and perfectly retractile. The fur is silky at the base, and soft to the touch. The whiskers are very long. The ground-colour is of a delicate yellowish-white: four broad transverse bands of rich blackish-



41.—Delungus.

brown traverse the back at equal intervals ; an interrupted stripe, originating behind the eye and between the ears, passes along the side, and terminates in large spots on the thigh ; the shoulder is similarly spotted ; and the tail is ringed at regular but increasing intervals. The *toute ensemble* brings to mind the cloudings on a rich piece of tortoiseshell. Fig. 40 presents a front view of the head : *d*, the fore-foot covered with fur ; *e*, the hind-foot with the fur removed.

#### THE CRYPTOPROCTA (*Cryptoprocta ferox*).

This remarkable and rare animal is a decided link between the Viverrine and the Feline groups, approach-

ing very nearly to the latter in external characters, and still more so in internal anatomy.

The body is slender, but the limbs are robust and muscular; the head is narrow; the eyes rather small; the ears unusually large and rounded; the toes five on each foot; the tail long. General colour a light brownish-red. (Fig. 42.)



42.—Cryptoprocta.

The individual on which Mr. Bennett founded his description was immature, having not yet lost its milk-teeth; it was thirteen inches and a half in the length of the head and body, that of the tail being eleven inches and a half.

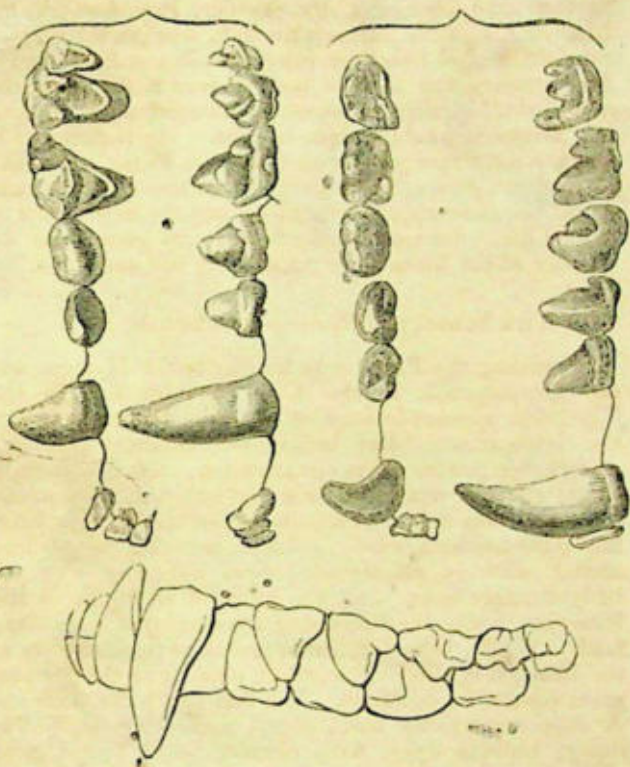
Of the habits of the *Cryptoprocta ferox* nothing definite is known. The specimen in question was sent

to the Zool. Soc. by Mr. Telfair, President of the Mauritius Natural History Society, who states that he received it alive from the interior and southern part of Madagascar, and that he had not seen in the Mauritius any of the Madagascar people that were acquainted with it. Hence it would seem to be rare. He remarks, "It was the most savage creature of its size I ever met with; its motions, power, and activity were those of a tiger, and it had the same appetite for blood and the destruction of animal life. Its muscular force was very great, and the muscles of the limbs were remarkably full and thick."

#### THE SURICATE (*Ryzana tetradactyla*, Ill.).

Regarding the Proteles as leading to the Hyænas, and the Cryptoprocta to the Cats, another line of the Viverridæ appears to conduct us to the Ferrets, through the Ichneumons. But before we notice these, two remarkable genera claim our attention, each containing a single species, which in form and habits appears to exhibit a certain degree of affinity to the Racoons, having, like those animals, a long, pointed, movable nose; feet almost entirely plantigrade; eyes obliquely set; body strongly built; and the habit of sitting up on the haunches, while the fore-paws are employed in holding food. While, however, the approach of these species to the Racoons is discernible, their alliance to the Ichneumons cannot be mistaken. We first select the Suricate. A nose remarkably long, sharp, and flexible; quick, lively, oblique eyes, with circular pupils; and close ears, give a peculiar expression to the physiognomy of the Suricate. The toes on each foot are four, those of the anterior limbs being armed with large hooked claws, miniature copies of those of the Sun-bears. The dentition (Fig. 43) resembles that of the ichneumons, except that there is one false molar less on each side, above and below.

This rare animal is a native of Southern Africa, and is eminently carnivorous in its habits. Its length is about a foot, exclusive of the tail, which is nearly six



43.—Teeth of Suricate.

inches. There are two scent-glands. The general colour is yellowish-gray, waved transversely with dark brown and rufous, the hairs, as in the ichneumons, being ringed with different tints; the tail is rufous-brown, ending in black. The fur is long and rather coarse. (Fig. 44.)

We have had an opportunity of observing two specimens, a male and female, in captivity; they were

lively, inquisitive, and docile, but betrayed great excitement when birds or other small animals were presented before their cage, endeavouring to seize or dart upon them. They used their paws with much address, and would sit up, peeping between the wires, or caressing each other, for they exhibited great mutual attachment.

The female died first; the male became dull, pined, and shortly followed his companion. The notes of their anatomy, by Professor Owen, are given in the 'Zoological Proceedings' for 1830-31.



44.—Suricate.

#### THE MANGUE (*Crossarchus obscurus*).

The Mangue, the only known representative of the genus *Crossarchus*, is a native of Sierra Leone and other parts of Western Africa. It resembles the Suricate in the form of the head and nose, in dentition, and general structure, internal as well as external. It



45.—Mangue.

has, however, five toes on each foot, and is fairly plantigrade. Its general colour is deep chocolate-brown, grizzled with yellowish-white, each hair being ringed with this colour. (Fig. 45.) The individual which we have observed in captivity resembled the Suricate in its habits, and was very intelligent. With respect to its manners in a state of nature we have no particular details. In the 'Zool. Proceeds.' for 1834 will be found an account of the internal anatomy of this animal, compared with that of the Suricate and the Viverridæ in general.

#### THE EGYPTIAN ICHNEUMON

(*Herpestes Pharaonis*, Desm.)

With long agile bodies, small glowing eyes, a pointed nose, long tail, short limbs, and semi-plantigrade feet, the Ichneumons, or Mangoustes, as they are also called

lively, inquisitive, and docile, but betrayed great excitement when birds or other small animals were presented before their cage, endeavouring to seize or dart upon them. They used their paws with much address, and would sit up, peeping between the wires, or caressing each other, for they exhibited great mutual attachment.

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(*Herpestes Pharaonis*, Desm.)

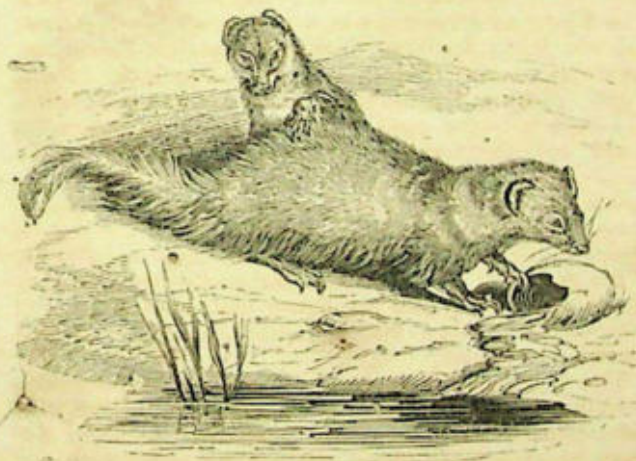
With long agile bodies, small glowing eyes, a pointed nose, long tail, short limbs, and semi-plantigrade feet, the Ichneumons, or Mangoustes, as they are also called

(*Mangusta*, Oliv. ; *Ichneumon*, Geoff. ; *Herpestes*, Illig.), in their general form, no less than in their habits, display a certain approximation to the ferrets, being bold, active, and sanguinary, and unrelenting destroyers of birds, reptiles, and small mammalia, which they take by surprise, darting rapidly upon them. Beautiful, cleanly, and easily domesticated, they are often kept tame in the countries they naturally inhabit, for the purpose of clearing the houses of vermin, though the poultry-yard is not safe from their incursions. The ears are short, wide, and rounded; the hair long, rather coarse, and waved or grizzled, each hair being ringed with different tints; the scent-gland is large; the feet are five-toed, the nails sharp and semi-retractile; the pupils of the eyes oblong: Fig. 34 gives the dentition. The ichneumons are natives of the hotter parts of the Old World, the species being respectively African and Indian. Night is their season of activity, they then prowl in quest of their prey, stealing along with noiseless step, urged by hunger and the instinct of destruction. The Egyptian ichneumon is a native of North Africa, and was deified for its services by the ancient Egyptians. Its Coptic name is Nems; its Arabic, among the Moors, Serro. Snakes, lizards, birds, crocodiles newly hatched, and especially the eggs of the crocodile, constitute its food; and the ancients believed that it attacked and killed that huge reptile when fully grown. Pliny states that when gorged with food, and lying with the mouth open, a little bird, called Trochilos, enters the jaws of the crocodile to pick the teeth, to the great satisfaction of the monster; and he adds, that the ichneumon espying him asleep, darts down his throat and tears his inside. We need not enter into any grave refutation of this marvellous account.

The ichneumon is fierce and daring, and glides with sparkling eyes towards its prey, which it follows with snake-like progression; often it watches patiently for hours together in one spot, waiting the appearance of a mouse, rat, or snake from its lurking-place. We have frequently seen the animal sit up like the Suricate while

feeding. In a state of domestication it is gentle and affectionate, and never wanders from the house or returns to an independent existence; but it makes itself familiar with every part of the premises, exploring every hole and corner, inquisitively peeping into boxes and vessels of all kinds, and watching every movement or operation. Sonnini, who travelled in 1777-8-9, observes that few or none are now reared in Egypt in a state of domestication; Hasselquist, however, mentions that Mr. Barton, English Consul in Egypt, had a tame ichneumon, and adds that it frequently goes about the houses like a cat. It would appear that, like the polecat, it often depopulates the fowl-roost.

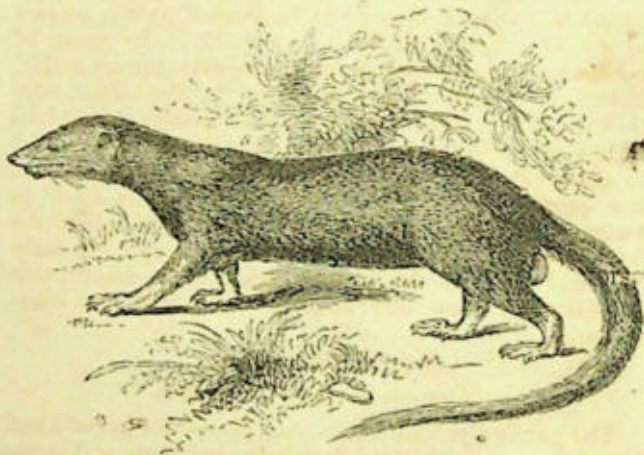
The colour of the Egyptian ichneumon is brownish-gray, each hair being ringed with white and dark tints of brown; the tail tapers towards the extremity, which is tufted and black. Length twenty-one inches, exclusive of tail, which is eighteen.



46.—Indian Ichneumons.

THE INDIAN ICHNEUMON (*Herpestes griseus*).

This species is much less than the Egyptian ichneumon, and of a beautiful freckled-gray. (Fig. 46.) It is common in India, and frequently brought to this country; it is easily tamed, and is inquisitive, active, cleanly, and docile. Mr. Bennett, in his account of one kept in the Tower, says that on one occasion it killed no fewer than a dozen full-grown rats, which were turned out before it in a room sixteen feet square, in less than a minute and a half.



47.—Garangan.

THE GARANGAN (*Herpestes Javanicus*).

According to Dr. Horsfield, this species, termed Garangan by the Javanese, inhabits chiefly the large teak-forests, and its agility is greatly admired by the natives: it attacks and kills serpents with excessive boldness. "It is very expert in burrowing in the ground, which process it employs ingeniously in the

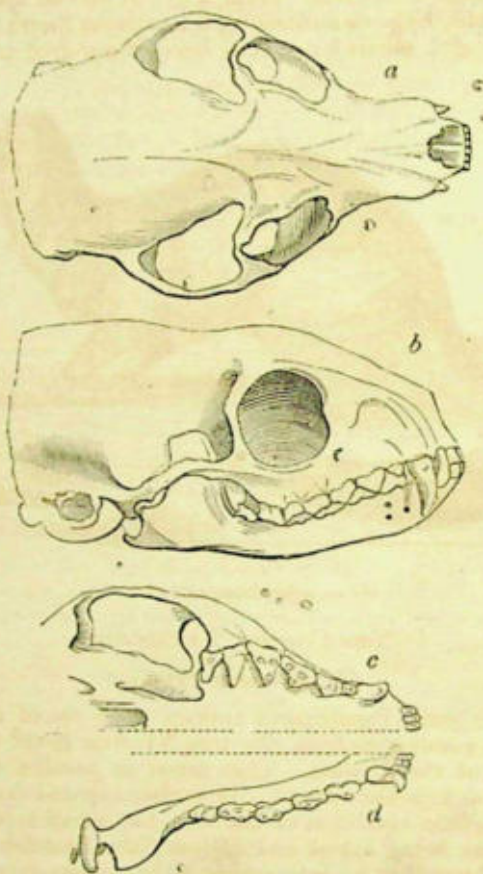
pursuit of rats. It possesses great natural sagacity, and, from the peculiarities of its character, it willingly seeks the protection of man. It is easily tamed, and in its domestic state is docile, and attached to its master, whom it follows like a dog; it is fond of caresses, and frequently places itself erect on its hind-legs, regarding everything that passes with great attention. It is of a very restless disposition, and always carries its food to the most retired place to consume it. It is very cleanly in its habits; it is exclusively carnivorous, and very destructive to poultry, employing great artifice in surprising chickens: hence the natives seldom keep it tamed, nor is it altogether to be trusted, as it is subject to fits of excessive violence. (Fig. 47.) Its mode of encountering serpents was related by the natives to Dr. Horsfield, exactly as it is described by Rumphius, who informs us that the Javanese nobles amuse themselves with these contests. When the two enemies are opposed to each other, the serpent endeavours to twine round the quadruped and kill it; the latter inflates itself to turbulence, and, as the reptile is about to inflict the fatal wounds, contracts its body, slips through the scaly coil, and seizes its foe by the neck. We suspect that in this story some allowance must be made for over-colouring.

### STEEDMAN'S CYNICTIS

(*Cynictis Steedmannii*, Ogilb.).

The genus *Cynictis* differs from *Herpestes* in the number of the toes on the hind-feet being only four, and in the absence of a false molar on the lower jaw. The tail is long and bushy. The characters of the skull and dentition are seen at Fig. 48: *a*, the skull from above; *b*, the same in profile; *c*, the dentition of the upper jaw; *d*, the dentition of the lower jaw.

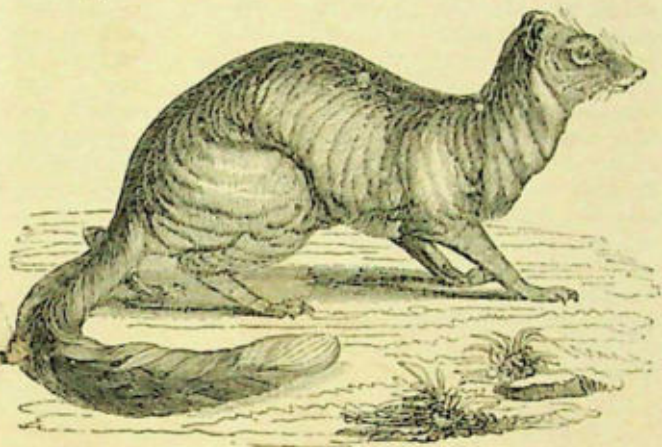
The *Cynictis Steedmannii* is a native of South Africa, and appears to resemble the ichneumon in its general habits. It excavates burrows in which it dwells. Though only introduced to our knowledge within the last few years, it was most probably seen by Sparrman and Barrow, the



48.—Skull and Teeth of Cynictis.

latter of whom describes an animal so closely resembling the present, that there can be no doubt as to their identity. The general colour is foxy-red; the tail is bushy, tipped with white. Length one foot six inches, exclusive of the

tail, which is one foot. (Fig. 49.) A second species of this genus, *Cynictis melanurus*, is a native of Sierra Leone; and several others have been lately discovered in South Africa.



49.—Steedman's *Cynictis*.

### THE COMMON PARADOXURE

(*Paradoxurus Typus*).

The genus *Paradoxurus* appears to be one of the links which conduct us from the true *Viverræ* to the aberrant forms of the *Ursidæ*. This genus is peculiar to India and the adjacent islands. It is characterized by a semi-plantigrade condition of the feet, the greater portion of the sole being naked and callous; the toes five, closely united together by intervening webs; claws short, sharp, and semi-retractile; the pupil linear; a mere fold instead

of scent-pouches; molars  $\frac{6-6}{6-6}$ ; nearly resembling those

of the *Genets*; the tail frequently spirally contorted, but not prehensile; the fur full.

In size the Paradoxure exceeds a common cat, its total length, including the tail, being three feet. The general colour is grayish-black tinged with yellow, and indistinctly banded and spotted with a dusky hue; a whitish streak occupies the cheek below the eye, and another runs above; muzzle black. (Fig. 50.) The Paradoxures are to a great extent frugivorous, and are in the habit of climbing trees, which they do with great facility. Dr. Horsfield, in his 'Zoological Researches,' gives a description of the *Java paradoxure*, or Musang, well worthy of notice. Its manners, he observes, are very similar to those of the Genet. "If taken young, it becomes patient and gentle during confinement, and receives readily animal and vegetable food. It requires little attention, and contents itself with the scanty remains of the meals of the natives, with fish, eggs, rice, potatoes, &c., the structure of its teeth being particularly adapted to vegetable

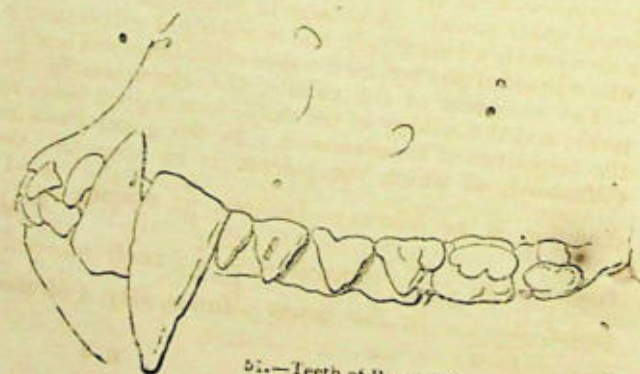
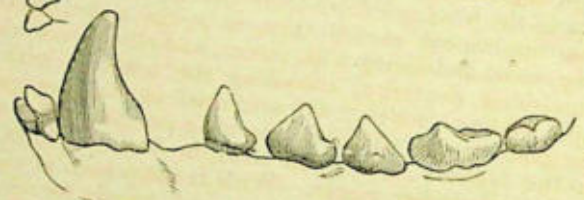
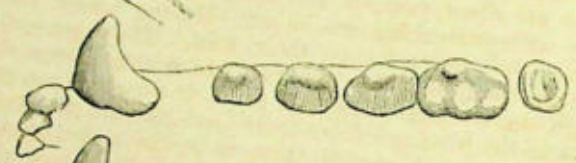
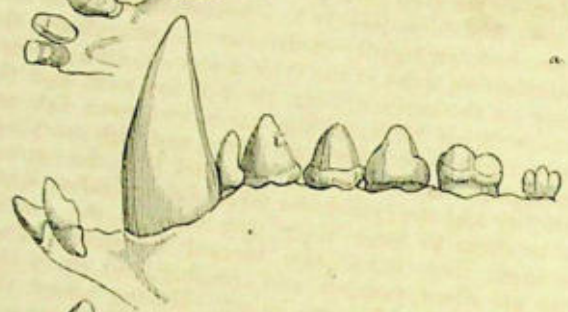
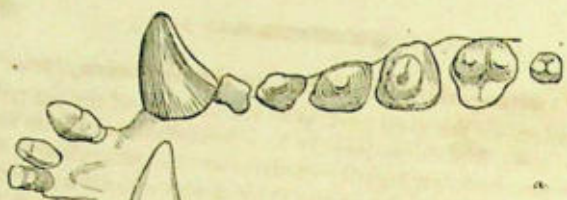


50.—The Paradoxure.

diet. It prefers, however, the delicate and pulpy fruits, but when pressed by hunger attacks fowls and birds. It is most abundant near the villages situated at the confines of large forests, and constructs a simple nest in the manner of squirrels, of dry leaves, grass, or small twigs, in the forks of larger branches or in the hollow of trees. From these it sallies forth at night to visit the sheds and hen-roosts of the natives, in search of eggs, chickens, &c. Its rambles are also particularly directed to gardens and plantations, where fruits of every description within its reach, and particularly pine-apples, suffer extensively from its depredations." The coffee-plantations in some parts of the island are greatly infested by it, and on this account it has obtained the name of coffee-rat. It selects the most ripe and perfect berries, and as the seeds pass uninjured through the alimentary viscera, it spreads that plant extensively, and gives origin to splendid groves in various parts of the forests, but particularly on the declivities of hills, thus counterbalancing the injuries it commits. Its native name is Leewak.

#### THE BINTURONG.

Fig. 51 represents the dentition of the Binturong (*Artitis Binturong*, Tem.; *Ictides ater*, Cuv.). This animal, a native of Java and Sumatra, represents in its own country the kinkajou of the forests of South America. It is a slow, heavy, plantigrade animal, with short limbs, and a long, powerful, prehensile tail, very thick and muscular at the base, and with which it assists itself in climbing, being arboreal in its habits. One that was kept alive many years by Major Farquhar partook both of animal and vegetable food. It is timid and nocturnal, sleeping during the day, and wandering about at night in quest of food. In size it exceeds a domestic cat, measuring two feet five inches in the length of the head and body, the tail being upwards of two feet. Its fur is long and coarse; general colour black; pupils of the eyes linear. Cuvier notices the approximation of these animals to the racoons.



51.—Teeth of Rinturong.

## FAMILY—MUSTELIDÆ, or the WEASELS, &amp;c.

Smaller, for the most part, than the animals of the cat tribe (Felidæ), and consequently less formidable as far as man is concerned, but equally carnivorous and sanguinary, the Mustelidæ (we speak of the typical species) are appointed to prey on the multitudinous races of the weak and the timid—such as birds, rabbits, hares, and even fish and reptiles: of slender elongated figure, and with short legs, they appear to glide along, and indeed, from the extreme flexibility and the cylindrical form of their bodies, which enable them to force their way through the smallest openings, they have been termed Vermiform Feræ. They are silent, cautious, and creeping, and attack their prey with unflinching resolution. Having seized their victim, they never let go their hold. They generally aim at the neck below the ear, where they pierce the large blood-vessels with their teeth, or they fix upon the back of the head and drive their teeth through the skull. Few quadrupeds exceed them in agility and address; they bound and spring with vigour, and climb trees with astonishing dexterity, traversing the branches with a rapid gliding motion. Of nocturnal habits, they pass the greatest part of the day in their retreats, which are in the hollows of decayed trees, in burrows, holes in walls, and similar places. With the approach of night they rouse from their slumbers, and, greedy for blood, begin their prowl. A polecat in the neighbourhood of a farmyard is a direful pest, and in one night will destroy a whole brood of poultry, for the sake of the blood and brains.

The shortness of the muzzle, the characters of the teeth, and the solidity of the skull, form a good index of the disposition of these animals. In the genus *Putorius* (*Mustela*), of which the polecat is an example, the

dentition is as follows:—Incisors,  $\frac{6}{6}$ ; canines,  $\frac{1-1}{1-1}$ ;  
false molars,  $\frac{2-2}{3-3}$ ; carnassière,  $\frac{1-1}{1-1}$ ; small tubercular  
molar,  $\frac{1-1}{1-1}$ . In the genus *Martes*, Ray (*Mustela*,

Cuvier), of which the Marten is an example, the false molars are  $\frac{3-3}{4-4}$ . In the genus *Gulo* the dentition (as seen in Fig. 52) is as in the genus *Martes*.

In a commercial point of view the present family is by no means unimportant. From several species the most costly furs are procured, pre-eminent for beauty; we need only mention the sable (*Martes Zibellina*), and the ermine (*Mustela erminea*). The true sable is a native of the dreary regions of Siberia, where it haunts the gloomy pine-forests which stretch over immense tracts of country remote from human abodes. It is into the midst of these wilds that the sable-hunter has to penetrate in the pursuit of his game, and the chase is carried on in the winter, for it is then that the fur is the finest. Great are the hunter's perils and privations. He has to traverse plains and mountains covered with snow, and swept by the keen tempests of an arctic winter—to spend days and nights in patient watching, and in the solitudes of the dismal forest;—he is exposed to overwhelming snow-storms, of which, in our climate, we can form but an imperfect idea. He often loses his way; his provisions fail, and he finds himself exposed to all the horrors of cold and famine. Who has not heard of the hardships of the hunter of sables in the deserts of Siberia?

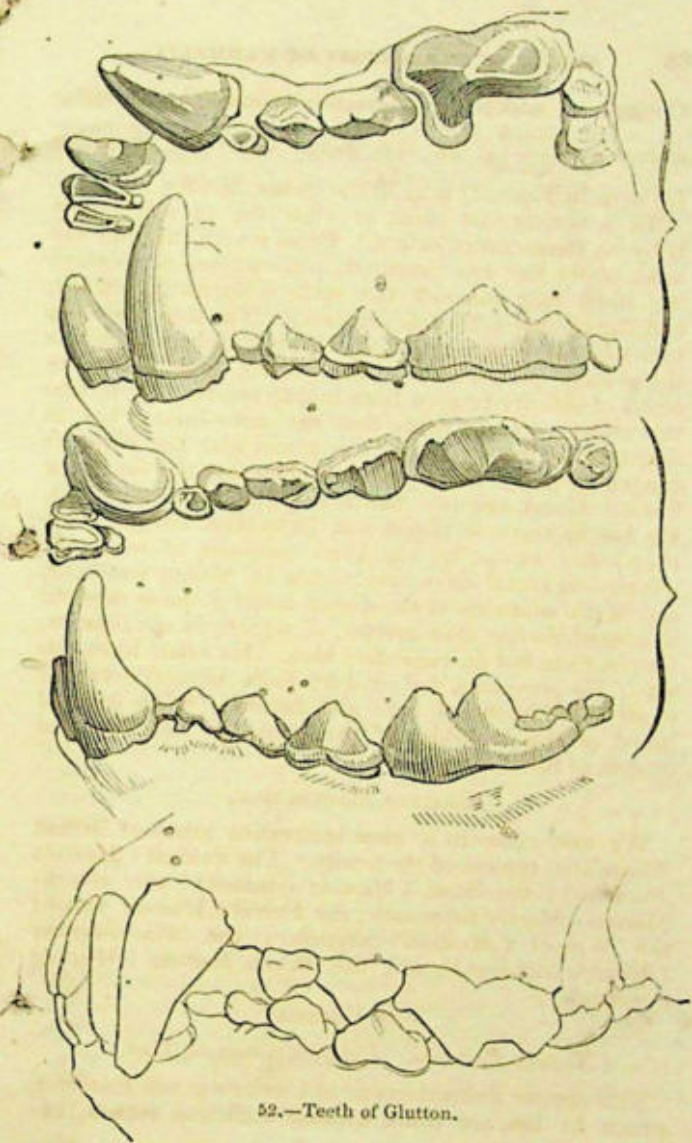
#### BRITISH MUSTELIDÆ.

We now come to a most interesting group of British *Mustelidæ*, typical of the family. The Polecat (*Mustela Putorius*); the Stoat (*Mustela erminea*); the Beech-Marten (*Martes fagorum*); the Ferret (*Mustela furo*); the Weasel (*Mustela vulgaris*); the Pine-Marten (*Mustela abietum*); and the Beech-Marten (*Mustela fagorum*).

#### THE POLECAT

(*Mustela Putorius. Putorius communis*, Cuv.).

This species forms the type of Cuvier's genus *Putorius*, which he has, we think without sufficient reason, ex-



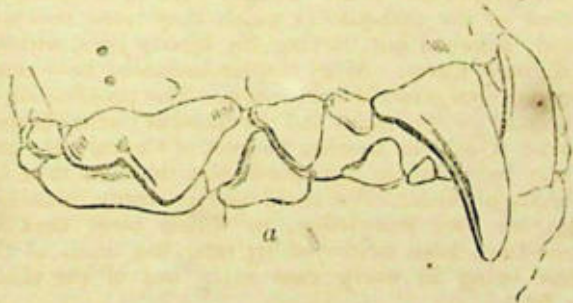
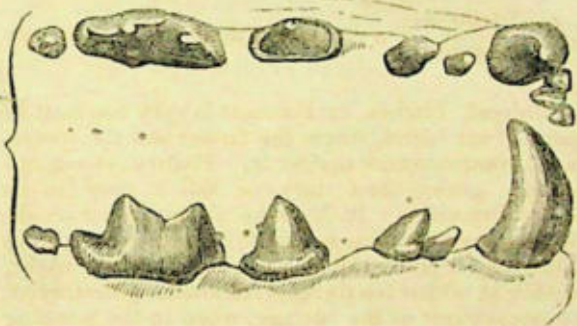
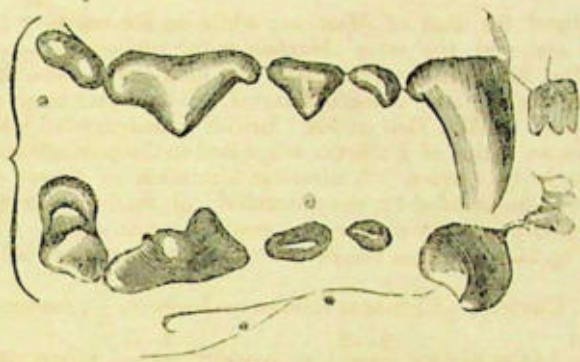
52.—Teeth of Glutton.

changed for that of *Mustela*; while on the contrary he has assigned the term *Mustela* as the subgeneric name of the Martens, to which Ray had long since given the more appropriate name of *Martes*. The latter name is adopted by Mr. Bell in his 'British Quadrupeds,' who takes no notice of *Putorius* as applied to the polecats and weasels by Cuvier. A needless alteration of names is ever to be avoided by the naturalist, as tending not to simplicity and knowledge, but confusion and doubt.

Fig. 53 represents the dentition of the *Mustela* (*Putorius*, Cuvier), which is as follows:—Incisors,  $\frac{6}{6}$ ; canines,  $\frac{1-1}{1-1}$ ; false molars,  $\frac{2-2}{3-3}$ ; carnassière,  $\frac{1-1}{1-1}$ ; tubercular molar,  $\frac{1-1 \text{ trilobed}}{1-1 \text{ minute}}$ : *a* represents the teeth of both jaws together.

The Polecat, Fitchet, or Fomart is very common in some parts of our island, where the farmer and the sportsman make common cause against it. Poultry, young and old, ducks, geese, and turkeys fall a prey to its sanguinary disposition; it destroys all within its reach. Mr. Bell instances one case in which sixteen large turkeys were killed by a polecat during the course of one night, and another in which ten ducks were similarly destroyed, and the perpetrator of the outrage, when in the morning the door of the outhouse in which they were shut was opened, marched out, licking his bloody jaws, without the slightest alarm. Many similar instances have come under our own personal knowledge. The predilection of the polecat for the brains and the blood of poultry is well known; it seldom touches the rest of the carcass; and we may here observe that rats display the same taste for the brains of birds. We could adduce many instances, within our own knowledge, in which birds kept in aviaries have been destroyed by rats, the brain of the victims being in every case eaten out of the skull. (Fig. 54.)

It is generally in winter that the polecat haunts the



53.—Teeth of Polecat.



54.—Polecat.

farm-yard. In summer it resorts to plantations, woods, and preserves of game, where it makes havoc among leverets, young partridges, and pheasants; nor are the nests of birds safe from its attacks, the eggs or callow brood being equally acceptable. No animal is more pernicious in the rabbit-warren. It can follow its prey through their subterranean galleries, which the fox cannot do; besides which, its love of slaughter seems insatiable. It would appear that even the tenants of the water are not safe from its attacks. Mr. Bewick, on his own testimony, affirms that in one instance eleven fine eels were discovered in the retreat of a polecat near a rivulet, to which its nocturnal visits were rendered apparent by tracks in the snow, both of its feet and of the writhing eels. In Loudon's 'Magazine' (vol. vi. p. 206) an instance is related in which the nest of a female

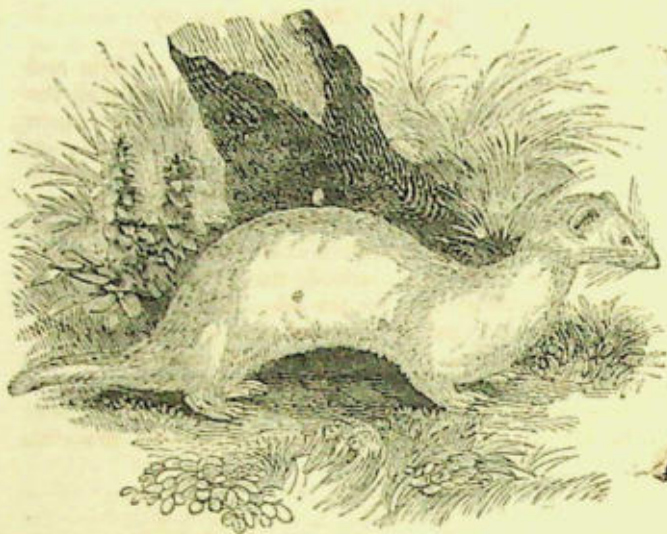
polecat was opened containing five young ones, while in a side hole were packed forty large frogs and two toads, barely alive, each having been paralyzed by a bite through the brain. When attacked by dog or man, the polecat makes a vigorous resistance, and will defend itself to the last. The female breeds in the spring, making a nest of dry grass in her burrow. The young are from three to five in number. The adult polecat measures about one foot four or five inches in length, exclusive of the tail, which measures nearly six inches. The body is covered with a woolly undercoat, and this, with the base of the long hairs, which form an outer garment, is of a pale yellow; the extremities of the long hairs are of a deep glossy blackish-brown; the margins of the ears and part of the lips are white.

Though by no means so valuable as that of the sable or marten, the fur of this animal (known generally by the name of Fitch) is imported very extensively from the north of Europe, and is abundant in the furriers' shops of our metropolis.

### THE FERRET

Is closely allied to the polecat; so closely, indeed, that many naturalists regard them as the same species, the more especially as a mixed breed between them may be procured. We do not, however, consider this opinion to be correct. The polecat is a native of temperate and northern Europe; the ferret of Africa, whence, as we are told by Strabo, it was imported into Spain for the purpose of destroying rabbits, with which, at one period, that country was injuriously overrun. From Spain it has spread through the rest of Europe, not as a wild, but as a domesticated animal.

From the earliest times it was used in the capture of rabbits by being turned, muzzled, into their burrows. Pliny alludes to this practice in his eighth book. The ordinary colour of the ferret is yellowish-white; but we have frequently seen specimens of a brown colour; these, indeed, were said to be of the mixed breed between the



55.—Ferret.

polecat and the ferret, and probably were so, as they were always larger and stouter than the white. (Fig. 55.) One of the brown kind, in the possession of a relative of the writer's, was so tame as to be allowed the liberty of the house, and it slept in his chamber—a dangerous experiment, as instances have been known of their attacking persons and wounding them severely. An instance in which an infant nearly fell a sacrifice to a ferret is related by Mr. Jesse, in his 'Gleanings,' and quoted by Mr. Bell. The child had the jugular vein and the temporal artery opened; the face, neck, and arms lacerated; and the sight of one eye destroyed. The ferret is not only employed by the warrener, but also by the rat-catcher, who prefers the mixed breed.

The ferret is very sensitive of cold, and requires to be kept snug and warm, especially during winter, as it perishes if exposed to the severity of the season.

THE WEASEL (*Mustela vulgaris*)

Is so well known, that any description of its form and colour is useless. Small as this animal is, it has all the courage and ferocity of its race, and will prey upon leverets, chickens, young pigeons, and ducklings; its favourite food, however, are mice, rats, water-rats, and even moles. In the farmer's stack-yard and granary it is of the greatest utility, and well repays by valuable services the occasional abstraction of a chicken, a pigeon, or a few eggs. Of this, indeed, many farmers are well aware, and encourage it for the sake of the incessant warfare it keeps up against mice and rats, which, from their excessive numbers, often occasion a serious loss in grain, besides undermining the barns and outhouses.

The weasel climbs trees and runs up the side of a wall with facility, its movements being singularly graceful.



56.—The Weasel.

(Fig. 56.) When it attacks its prey, it fixes its teeth on the back of the head, and pierces the brain, which it then devours. It is said to prefer putrid flesh to that just killed, but this is very doubtful, and has arisen most probably from the circumstance of dead birds in a putrid state having been found in its hole or near its retreat, left by their destroyer. The weasel hunts by the scent, like a dog; and follows mice and moles with the utmost perseverance, tracking them through all their runs or winding galleries. It will even cross the water in the pursuit, if its prey be in sight, nor does swiftness avail, for onwards will the weasel travel, till its victim fails from exhaustion. The wolverene of North America (*Gulo arcticus*) pursues the beaver and other prey in a similar manner.

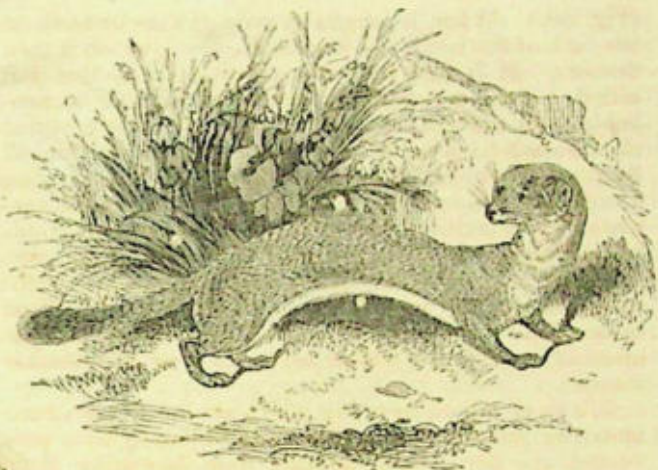
Instances are on record in which several weasels have united in attacking men, who with difficulty have prevented the fierce little animals from lacerating their throats, and certainly twelve or fifteen weasels would prove no mean adversaries.

The weasel often falls a prey to hawks, owls, and kites; but sometimes succeeds in coming off victorious. Many anecdotes are on record of weasels and stoats bringing eagles or large hawks to the ground—and Mr. Bell gives an instance, assuring us of its truth, in which a kite that had seized a weasel and mounted into the air, was observed to wheel irregularly, and at length to fall to the ground dead; the determined little animal having torn open the skin and large blood-vessels under its wing.

The weasel breeds two or three times in a year, having a litter of five at each birth. She makes her nest of dry herbage; a hole in the bank-side, among brambles, or in an aged tree, is the usual place of her retreat; and when molested, she defends herself and her progeny with indomitable courage.

#### THE STOAT (*Mustela erminea*)

Is allied very closely to the weasel, but is considerably larger, being upwards of nine inches long, excluding the tail. Its habits are precisely those of the weasel, but it



57.—Ermine : Summer dress.



58.—Ermine : Winter dress.

preys habitually on larger game, as hares, leverets, &c., not excluding the rat and water-rat. Of the latter, indeed, it destroys great numbers, following them into their burrows. It hunts its prey by the scent. Some idea of the extent of the depredations of this animal may be conceived from the circumstance of two leverets, two leverets' heads, two young partridges, and a pheasant's egg, having been found in the retreat of one. In our climate the stoat becomes partially white during the winter, but in more northern regions this change is complete. Large importations of ermine-fur are made from Russia, Norway, and Siberia to our country. In 1833 the importation amounted to 105,139 skins. Fig. 57 represents this animal in its summer dress; Fig. 58 exhibits, in its winter livery of snowy white, the tip of the tail remaining black, a beautiful contrast. In this stage it is the ermine of the furriers.

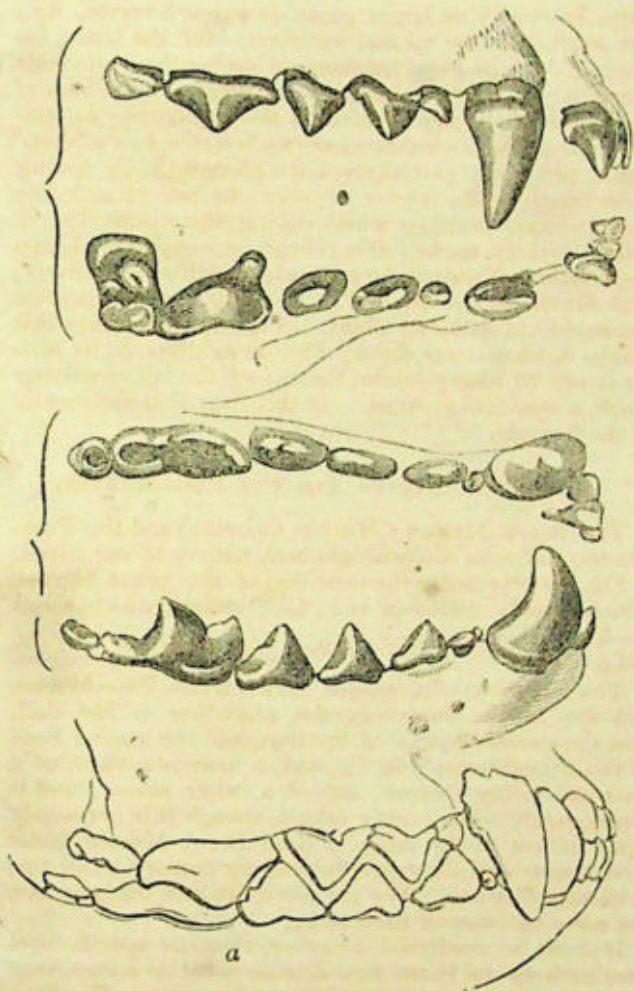
#### THE BEECH-MARTEN AND THE PINE-MARTEN.

The Beech-Marten (*Martes fagorum*) and the Pine-Marten (*Martes abietum*) are both natives of our island.

Fig. 59 represents the dentition of the genus *Martes*, which chiefly differs in the false molars, which stand  $\frac{3-3}{4-4}$ ; *a* shows the teeth of both jaws together.

The principal differences between the Pine-Marten and the Beech-Marten consist, according to Mr. Bell, "in the greater length of the legs, and the smaller head of the Pine-Marten; its fur, too, is more abundant, of a finer and softer texture, and of a richer colour; and is consequently more highly valued, though it is not nearly equal to that of the sable." The Beech-Marten is the most common of the two species in our country, excepting in certain districts. We are not quite sure that they are not mere varieties of each other.

It must be confessed, however, that the specific distinction between these two animals is by no means very apparent, nor indeed is it admitted by many. We have many times seen the yellow-breasted or pine-marten in



59.—Teeth of Marten.



60.—The Pine-Marten.

the fir-woods which clothe the sides of some of the hills in Derbyshire, and especially near Buxton. It prefers wild and unfrequented places, deep wooded glens, and the depths of forests; and is common throughout northern Europe. The beech-marten also frequents woods, but not so exclusively as the former, and often lurks about farm-houses and destroys poultry. Both are destructive to game. They take up their retreats in hollow trees or holes in rocks, and the female makes a nest of leaves and moss for her brood. The agility and gracefulness of these animals are remarkable; they climb trees with the ease of the squirrel, and traverse their branches or leap from bough to bough with admirable address and celerity. Their fur, especially that of the pine-marten, is full, deep and soft, and of a beautiful brown, and not far inferior to that of their immediate ally the sable. The marten exceeds the polecat in size, and the tail is long and bushy.



61.—Pine-Marten.

The ears are large and open, and the eyes bright and lively. In general instincts they agree with the other *Mustelæ*. (Figs. 60, 61, 62, and 63.)

Distinct from both of these we regard the American pine-marten, characterized by a shorter tail and fuller fur. Its skins are annually imported into England from North America, where it is abundant in the high latitudes. Dr. Richardson observes, that in America "particular races of martens, distinguished by the fineness and dark colour of their fur, appear to inhabit certain rocky districts. The rocky, mountainous, but wooded region of the Nipogon, on the north side of Lake Superior, has been long noted for its black and valuable martens' skins." The animal is usually taken in traps baited with the head of a bird. It is very bold, and when attacked shows its teeth, hisses like a

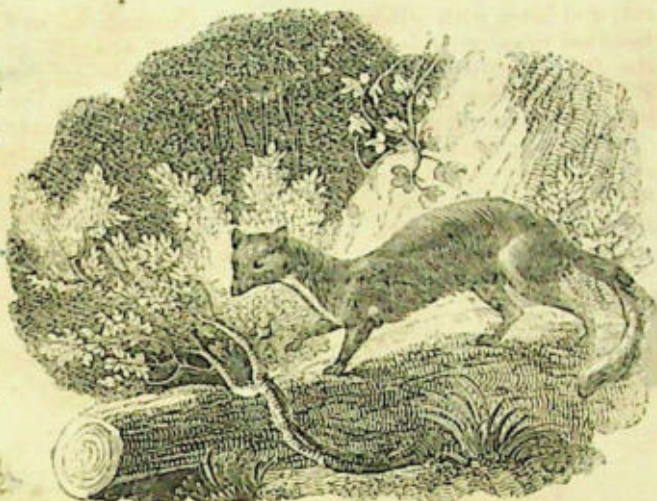
cat, and bites with great severity. "Upwards of one hundred thousand skins have been collected annually in the fur countries." Another and larger species, the Pekan, or Fisher (*Martes Canadensis*), is common in the northern parts of America, ranging from Pennsylvania to the Great Slave Lake, and from shore to shore across the country. Its fur is less valuable than that of the former. It gives preference to damp spots and humid forests bordering water.



62.—Beech-Marten.

#### THE GLUTTON (*Gulo arcticus*, Desm.).

Pallas and Gmelin referred the Glutton to the genus *Ursus*; it belongs, however, to the present family: see its dentition (Fig. 52). Linnæus rightly regarded it as



63.—Beech-Marten.

a *Mustela*.<sup>\*</sup> In their general port and figure the gluttons are intermediate between the polecats and the badgers. They have no decided scent-pouch, but a glandular fold of the skin.

Two varieties, perhaps species, of Glutton are known : one, a native of the high northern latitudes of the Old World ; the other, of the cold regions of America. The Old World species (*Gulo arcticus*), the *Russomak* of the Russians, is of a deep chestnut passing into black on the limbs, with a brown disc on the back. The American animal (*Gulo luscus*, Sabine), termed *Wolverene*, *Carcajôu*, and *Quick-hatch*, is paler. The glutton is nocturnal in its habits ; the limbs are strong and short ; the feet subplantigrade, with five toes, armed with sharp claws ; the head broad, ending in a narrow muzzle ; the ears are short and rounded ; the tail moderate. (Fig. 64.)

\* 'Syst. Nat.,' 12th edit. He retains, however, the term *Ursus* for the *Wolverene*, naming it *Ursus luscus*.

As we are inclined to regard the Old World and American gluttons as mere varieties, we shall not disjoin their history. The first writer who has described this animal is Olaus Magnus. "Among all animals," he says, "which are regarded as insatiably voracious, the glutton in the northern parts of Sweden has received an express appellation, being called, in the language of the country, Jerff; and in German, Vjelfrass. In the Slavonian language its name is Rossonaka, in allusion to its voracity: in Latin, however, it is only known by the fictitious name of Gulo, from its habits of gorging (gulo à gulositate appellatur)." — Ol. Mag., Hist. de Gent. Septent.

The glutton is indeed a voracious animal, but by no means formidable to man or the larger beasts, though, in



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