MAMMALIA OF

INDIA AND CEYLON.

FELIS TIGRIS.

NATURAL HISTORY

OF THE

MAMMALIA OF INDIA

AND CEYLON.

BY

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WITH 170 ILLUSTRATIONS BY THE AUTHOR, T. W WOOD, AND OTHERS.

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THIS

POPULAR

HISTORY OF OUR INDIAN MAMMALS

IS

Respectfully Dedicated

(BY PERMISSION)

TO ONE WHO TAKES A DEEP INTEREST IN ALL THAT CONCERNS OUR EASTERN EMPIRE,

THE RIGHT HON.

THE EARL OF NORTHBROOK, G.C.S.I.,

LATE GOVERNOR-GENERAL AND VICEROY OF INDIA.

PREFACE.

THIS work is designed to meet an existing want, viz. : a popular manual of Indian Mammalia. At present the only work of the kind is one which treats exclusively of the Peninsula of India, and which consequently omits the more interesting types found in Assam, Burmah, and Ceylon, as well as the countries bordering the British Indian Empire on the North. The geographical limits of the present work have been extended to all territories likely to be reached by the sportsman from India, thus greatly enlarging the field of its usefulness.

The stiff formality of the compiled "Natural Histories" has been discarded, and the Author has endeavoured to present, in interesting conversational and often anecdotal style, the results of experience by himself and his personal friends ; at the same time freely availing himself of all the known authorities upon the subject.

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NATURAL HISTORY

OF THE

MAMMALIA OF BRITISH INDIA AND CEYLON.

INTRODUCTION.

In laying before the public the following history of the Indian Mammalia, I am actuated by the feeling that a popular work on the subject is needed, and would be appreciated by many who do not care to purchase the expensive books that exist, and who also may be more bothered than enlightened by over-much technical phraseology and those learned anatomical dissertations which are necessary to the scientific zoologist.

Another motive in thus venturing is, that the only complete history of Indian Mammalia is Dr. Jerdon's, which is exhaustive within the boundaries he has assigned to India proper; but as he has excluded Assam, Cachar, Tenasserim, Burmah, Arracan, and Ceylon, his book is incomplete as a Natural History of the Mammals of British India. I shall have to acknowledge much to Jerdon in the following pages, and it is to him I owe much encouragement, whilst we were together in the field during the Indian Mutiny, in the pursuit of the study to which he devoted his life; and the general arrangement of this work will be based on his book, his numbers being preserved, in order that those who possess his 'Mammals of India' may readily refer to the noted species.

But I must also plead indebtedness to many other naturalists who have left their records in the 'Journals of the Asiatic Society' and other publications, or who have brought out books of their own, such as Blyth, Elliott, Hodgson, Sherwill, Sykes, Tickell, Hutton, Kellaart, Emerson Tennent, and others; Col. McMaster's 'Notes on Jerdon,' Dr. Anderson's 'Anatomical and Zoological Researches,' Horsfield's 'Catalogue of the Mammalia in the Museum of the East India Company,' 'Dr. Dobson's Monograph of the Asiatic Chiroptera,' the writings of Professors Martin Duncan, Flowers, Kitchen Parker, Boyd Dawkins, Garrod, Mr. E. R. Alston, Sir Victor Brooke and others; the Proceedings and Journals of the Zoological, Linnean, and Asiatic Societies, and the correspondence in *The Asian*; so that after all my own share is minimised to a few

marks here and there, based on personal experience during a long period of jungle life, and on observation of the habits of animals in their wild state, and also in captivity, having made a large collection of living specimens from time to time.

As regards classification, Cuvier's system is the most popular, so I shall adopt it to a certain extent, keeping it as a basis, but engrafting on it such modifications as have met with the approval of modern naturalists. For comparison I give below a synopsis of Cuvier's arrangement. I have placed Cetacea after Carnivora, and Edentata at the end. In this I have followed recent authors as well as Jerdon, whose running numbers I have preserved as far as possible for purposes of reference.

Cuvier divides the Mammals into nine orders, as follows. (*The examples I give are Indian ones, except where stated otherwise*) :—

Order I.—BIMANA. Man.

Order II.—QUADRUMANA. Two families—1st, Apes and Monkeys; 2nd, Lemurs.

Order III.—CARNARIA. Three families—1st, *Cheiroptera*, Bats; 2nd, *Insectivora*, Hedgehogs, Shrews, Moles, Tupaiæ, &c.; 3rd, *Carnivora*: Tribe 1, *Plantigrades*, Bears, Ailurus, Badger, Arctonyx; 2, *Digitigrades*, Martens, Weasels, Otters, Cats, Hyænas, Civets, Musangs, Mongoose, Dogs, Wolves and Foxes.

Order IV.—MARSUPIATA. Implacental Mammals peculiar to America and Australia, such as Opossums, Dasyures, Wombats, and Kangaroos. We have none in India.

Order V.—RODENTIA. Squirrels, Marmots, Jerboas, Mole-Rats, Rats, Mice, Voles, Porcupines, and Hares.

Order VI.—EDENTATA, or toothless Mammals, either partially or totally without teeth. Three families—1st, *Tardigrades*, the Sloths, peculiar to America; 2nd, *Effodientia*, or Burrowers, of which the Indian type is the Manis, but which includes in other parts of the world the Armadillos and Anteaters; 3rd, *Monotremata*, Spiny Anteaters or Echidnas, and the Ornithorynchus.

Order VII.—PACHYDERMATA, or thick-skinned Mammals. Three families—1st, *Proboscidians*, Elephants; 2nd, *Ordinary Pachyderms*, Rhinoceroses, Hogs; 3rd, *Solidungula*, Horses.

Order VIII.—RUMINANTIA, or cud-chewing Mammals. Four families—1st, *Hornless Ruminants*, Camels, Musks; 2nd, *Cervidæ*, true horns shed periodically, Deer; 3rd, *Persistent horns*, Giraffes; 4th, *Hollow-horned Ruminants*, Antelopes, Goats, Sheep and Oxen.

Order IX.—CETACEA. Three families—1st, *Herbivorous Cetacea*, Manatees, Dugongs; 2nd, *Ordinary Cetacea*, Porpoises; 3rd, *Balænidæ*, Whales.

ORDER BIMANA.

SOME people have an extreme repugnance to the idea that man should be treated of in connection with other animals. The development theory is shocking to them, and they would deny that man has anything in common with the brute creation. This is of course mere sentiment; no history of nature would be complete without the noblest work of the Creator. The great gulf that separates the human species from the rest of the animals is the impassable one of intellect. Physically, he should be compared with the other mammals, otherwise we should lose our first standpoint of comparison. There is no degradation in this, nor is it an acceptance of the development theory. To argue that man evolved from the monkey is an ingenious joke which will not bear the test of examination and the Scriptural account, may still be accepted. I firmly believe in man as an original creation just as much as I disbelieve in any development of the Flying Lemur (*Galeopithecus*) from the Bat, or that the habits of an animal would in time materially alter its anatomy, as in the case of the abnormal length of the hind toe and nail of the Jacana. It is not that the habit of running over floating leaves induced the change, but that an all-wise Creator so fashioned it that it might run on those leaves in search of its food. I accept the development theory to the extent of the multiplication of species, or perhaps, more correctly, varieties in genera. We see in the human race how circumstances affect physical appearance. The child of the ploughman or navvy inherits the broad shoulders and thick-set frame of his father; and in India you may see it still more forcibly in the difference between Hindu and Mahomedan races, and those Hindus who have been converted to Mahomedanism. I do not mean isolated converts here and there who intermarry with pure Mahomedan women, but I mean whole communities who have in olden days been forced to accept Islam. In a few generations the face assumes an unmistakable Mahomedan type. It is the difference in living and in thought that effects this change.

It is the same with animals inhabiting mountainous districts as compared with the same living in the plains; constant enforced exercise tells on the former, and induces a more robust and active form.

Whether diet operates in the same degree to effect changes I am inclined to doubt. In man there is no dental or intestinal difference, whether he be as carnivorous as an Esquimaux or as vegetarian as a Hindu; whereas in created carnivorous, insectivorous, and herbivorous animals there is a striking difference, instantly to be recognised even in those of the same family. Therefore, if diet has operated in effecting such changes, why has it not in the human race?

"Who shall decide when doctors disagree?" is a quotation that may aptly be applied to the question of the classification of man; Cuvier, Blumenbach, Fischer, Bory St. Vincent, Prichard, Latham, Morton, Agassiz and others have each a system.

Cuvier recognises only three types—the Caucasian, the Mongolian, and the Negro or Ethiopian, including Blumenbach's fourth and fifth classes, American and Malay in Mongolian. But even Cuvier himself could hardly reconcile the American with the Mongol; he had the high cheek-bone and the scanty beard, it is true, but his eyes and his nose were as Caucasian as could be, and his numerous dialects had no affinity with the type to which he was assigned.

Fischer in his classification divided man into seven races :—

1*st.*—*Homo japeticus*, divided into three varieties—*Caucasicus*, *Arabicus* and *Indicus*.

2*nd.*—*H. Neptunianus*, consisting of—1st, the Malays peopling the coasts of the islands of the Indian Ocean, Madagascar, &c.; 2nd, New Zealanders and Islanders of the Pacific; and, 3rd, the Papuans.

3*rd.*—*H. Scythicus*. Three divisions, viz.: 1st, Calmucks and other Tartars; 2nd, Chinese and Japanese; and, 3rd, Esquimaux.

4*th.*—*H. Americanus*, and

5*th.*—*H. Columbicus*, belong to the American Continent.

6*th.*—*H. Æthiopicus*. The Negro.

7*th.*—*H. Polynesius*. The *inland* inhabitants of the Malay Peninsula, of the Islands of the Indian Ocean, of Madagascar, New Guinea, New Holland, &c.

I think this system is the one that most commends itself from its clearness, but there are hardly two writers on ethnology who keep to the same classification.

Agassiz classifies by realms, and has eight divisions.

The Indian races with which we have now to deal are distributed, generally speaking, as follows :—

Caucasian.—(*Homo japeticus*, Bory and Fischer). Northerly, westerly, and in the Valley of the Ganges in particular, but otherwise generally distributed over the most cultivated parts of the Peninsula, comprising the Afghans (Pathans), Sikhs, Brahmins, Rajputs or Kshatryas of the north-west, the Arabs, Parsees, and Mahrattas of the west coast, the Singhalese of the extreme south, the Tamils of the east, and the Bengalis of the north-east.

Mongolians (*H. Scythicus*), inhabiting the chain of mountains to the north, from Little Thibet on the west to Bhotan on the east, and then sweeping downwards southerly to where Tenasserim joins the Malay Peninsula. They comprise the Hill Tribes of the N. Himalayas, the Goorkhas of Nepal, and the Hill Tribes of the north-eastern frontier, viz. Khamtis, Singphos, Mishmis, Abors, Nagas, Jynteas, Khasyas, and

Cheros. Those of the northern borders: Bhotias, Lepchas, Limbus, Murmis and Haioos; of the Assam Valley Kachari, Mech and Koch.

The Malays (*H. Neptunianus*) Tipperah and Chittagong tribes, the Burmese and Siamese.

Now comes the most difficult group to classify—the aborigines of the interior, and of the hill ranges of Central India, the Kols, Gonds, Bhils, and others which have certain characteristics of the Mongolian, but with skins almost as dark as the Negro, and the full eye of the Caucasian. The main body of these tribes, which I should feel inclined to classify under Fischer's *H. Polynesius*, have been divided by Indian ethnologists into two large groups—the Kolarians and Dravidians. The former comprise the Juangs, Kharrias, Mundas, Bhumij, Ho or Larka Kols, Santals, Birhors, Korwas, Kurs, Kurkus or Muasis, Bhils, Minas, Kulis. The latter contains the Oraons, Malers, Paharis of Rajamahal, Gonds and Kands.

The Cheroos and Kharwars, Parheyas, Kisans, Bhuikers, Boyars, Nagbansis, Kaurs, Mars, Bhunyiars, Bendkars form another great group apart from the Kolarians and Dravidians, and approximating more to the Indian variety of the Japetic class.

Then there are the extremely low types which one has no hesitation in assigning to the lowest form of the Polynesian group, such as the Andamanese, the jungle tree-men of Chittagong, Tipperah, and the vast forests stretching towards Sambhulpur.

On these I would now more particularly dwell as points of comparison with the rest of the animal kingdom. I have taken but a superficial view of the varieties of the higher types of the human race in India, for the subject, if thoroughly entered into, would require a volume of no ordinary dimensions; and those who wish to pursue the study further should read an able paper by Sir George Campbell in the 'Journal of the Asiatic Society' for June 1866 (vol. xxxv. Part II.), Colonel Dalton's 'Ethnology of Bengal,' the Rev. S. Hislop's 'Memoranda,' and the 'Report of the Central Provinces Ethnological Committee.' There is as yet, however, very little reliable information regarding the wilder forms of humanity inhabiting dense forests, where, enjoying apparently complete immunity from the deadly malaria that proves fatal to all others, they live a life but a few degrees removed from the Quadrumana.

I have in my book on the Seonee District described the little colonies in the heart of the Bison jungles. Clusters of huts imbedded in tangled masses of foliage, surrounded by an atmosphere reeking with the effluvia of decaying vegetation, where, unheedful of the great outer world beyond their sylvan limits, the Gonds pass year after year of uneventful lives.

In some of these hamlets I was looked upon with positive awe, as being the first white man the *Baigas* had seen. But these simple savages rank high in the scale compared with some others, of whom we have as yet but imperfect descriptions.

Some years ago Mr. Piddington communicated to the Asiatic Society an account of some "Monkey-men" he came across on the borders of the Palamow jungle. He was in the habit of employing the aboriginal tribes to work for him, and on one occasion a party of his men found in the jungle a man and woman in a state of starvation, and brought them in. They were both very short in stature, with disproportionately long arms, which in the man were covered with a reddish-brown hair. They looked almost more like baboons than human beings, and their language was unintelligible, except that words here and there resembled those in one of the Kolarian dialects. By signs, and by the help of these words, one of the Dhangars managed to make out that they lived in the depths of the forest, but had to fly from their people on account of a blood feud. Mr. Piddington was anxious to send them down to Calcutta, but before he could do so, they decamped one night, and fled again to their native wilds. Those jungles are, I believe, still in a great measure unexplored; and, if some day they are opened out, it is to be hoped that the "Monkey-men" will be again discovered.*

The lowest type with which we are familiar is the Andamanese, and the wilder sort of these will hardly bear comparison with even the degraded Australian or African Bosjesman, and approximate in debasement to the Fuegians.

The Andamanese are small in stature—the men averaging about five feet, the women less. They are very dark, I may say black, but here the resemblance to the Negro ceases. They have not the thick lips and flat nose, nor the peculiar heel of the Negro. In habit they are in small degree above the brutes, architecture and agriculture being unknown. The only arts they are masters of are limited to the manufacture of weapons, such as spears, bows and arrows, and canoes. They wear no kind of dress, but, when flies and mosquitoes are troublesome, plaster themselves with mud. The women are fond of painting themselves with red ochre, which they lay thickly over their heads, after scraping off the hair with a flint-knife. They swim and dive like ducks, and run up trees like monkeys. Though affectionate to their children, they are ruthless to the stranger, killing every one who happens to be cast away on their inhospitable shores. They have been accused of cannibalism, but this is open to doubt. The bodies of those they have killed have been found dreadfully mutilated, almost pounded to a jelly, but no portion had been removed.†

* There has been lately exhibited in London a child from Borneo which has several points in common with the monkey—hairy face and arms, the hair on the fore-arm being reversed, as in the apes.

† Since the above was written there has been published in the 'Journal of the Anthropological Institute,' vol. xii., a most interesting and exhaustive paper on these people by Mr. E. H. Man, F.R.G.S., giving them credit for much intelligence.

In the above description I speak of the savage Andamanese in his wild state, and not of the specimens to be seen at Port Blair, who have become in an infinitesimal degree civilised—that is to say, to the extent of holding intercourse with foreigners, making some slight additions to their argillaceous dress-suits, and understanding the principles of exchange and barter—though as regards this last a friend informs me that they have no notion of a token currency, but only understand the *argumentum ad hominem* in the shape of comestibles, so that your bargains, to be effectual, must be made within reach of a cookshop or grocery. The same friend tells me he learnt at Port Blair that there were marriage restrictions on which great stress was laid. This may be the case on the South Island; there is much testimony on the other side as regards the more savage Andamanese.

The forest tribes of Chittagong are much higher in the scale than the Andamanese, but they are nevertheless savages of a low type. Captain Lewin says: "The men wear scarcely any clothing, and the petticoat of the women is scanty, reaching only to the knee; they worship the terrene elements, and have vague and undefined ideas of some divine power which overshadows all. They were born and they die for ends to them as incomputable as the path of a cannon-shot fired into the darkness. They are cruel, and attach but little value to life. Reverence or respect are emotions unknown to them, they salute neither their chiefs nor their elders, neither have they any expression conveying thanks." There is, however, much that is interesting in these wild people, and to those who wish to know more I recommend Captain Lewin's account of 'The Hill Tracts of Chittagong.'

ORDER QUADRUMANA.

THE monkeys of the Indian Peninsula are restricted to a few groups, of which the principal one is that of the *Semnopitheci*. These monkeys are distinguished not only by their peculiar black faces, with a ridge of long stiff black hair projecting forwards over the eyebrows, thin slim bodies and long tails, but by the absence of cheek pouches, and the possession of a peculiar sacculated stomach, which, as figured in Cuvier, resembles a bunch of grapes. Jerdon says of this group that, out of five species found on the continent there is only one spread through all the plains of Central and Northern India, and one through the Himalayas, whilst there are three well-marked species in the extreme south of the Peninsula; but then he omits at least four species inhabiting Chittagong, Tenasserim, Arracan, which also belong to the continent of India, though perhaps

not to the actual Peninsula. Sir Emerson Tennent, in his 'Natural History of Ceylon,' also mentions and figures three species, of which two are not included in Jerdon's 'Mammals,' though incidentally spoken of. I propose to add the Ceylon Mammalia to the Indian, and therefore shall allude to these further on.

The next group of Indian monkeys is that of the Macaques or Magots, or Monkey Baboons of India, the *Lal Bundar* of the natives. They have simple stomachs and cheek pouches, which last, I dare say, most of us have noticed who have happened to give two plantains in succession to one of them.

Although numerically the *Langurs* or Entellus Monkeys form the most important group of the Quadrumana in India, yet the Gibbons (which are not included by Jerdon) rank highest in the scale, though the species are restricted to but three—*Hylobates hooluck*, *H. lar* and *H. syndactylus*. They are superior in formation (that is taking man as the highest development of the form, to which some people take objection, though to my way of thinking there is not much to choose between the highest type of monkey and the lowest of humanity, if we would but look facts straight in the face), and they are also vastly superior in intellect to either the *Langurs* or the *Macaques*, though inferior perhaps to the Ourangs.

GENUS HYLOBATES—THE GIBBONS,

Which, with the long arms of the Ourangs and the receding forehead of the Chimpanzee, possess the callosities of the true monkeys, but differ from them in having neither tail nor cheek pouches. They are true bipeds on the ground, applying the sole of the foot flatly, not, as Cuvier and others have remarked of the Ourangs, with the outer edge of the sole only, but flat down, as Blyth, who first mentions it, noticed it, with the thumb or big toe widely separated.

No. 1. HYLOBATES HOOLUCK.

The White-fronted Gibbon.

NATIVE NAMES.—*Hooluck, Hookoo.*

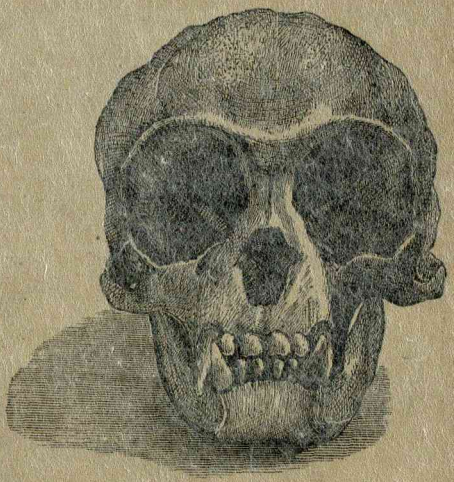
HABITAT.—Garo and Khasia Hills, Valley of Assam, and Arracan.

DESCRIPTION.—Males deep black, marked with white across the forehead. Females vary from brownish black to whitish-brown, without, however, the fulvous tint observable in pale specimens of the next species.

"In general they are paler on the crown, back, and outside of limbs, darker in front, and much darker on the cheeks and chin."—*Blyth.*

SIZE.—About two feet.

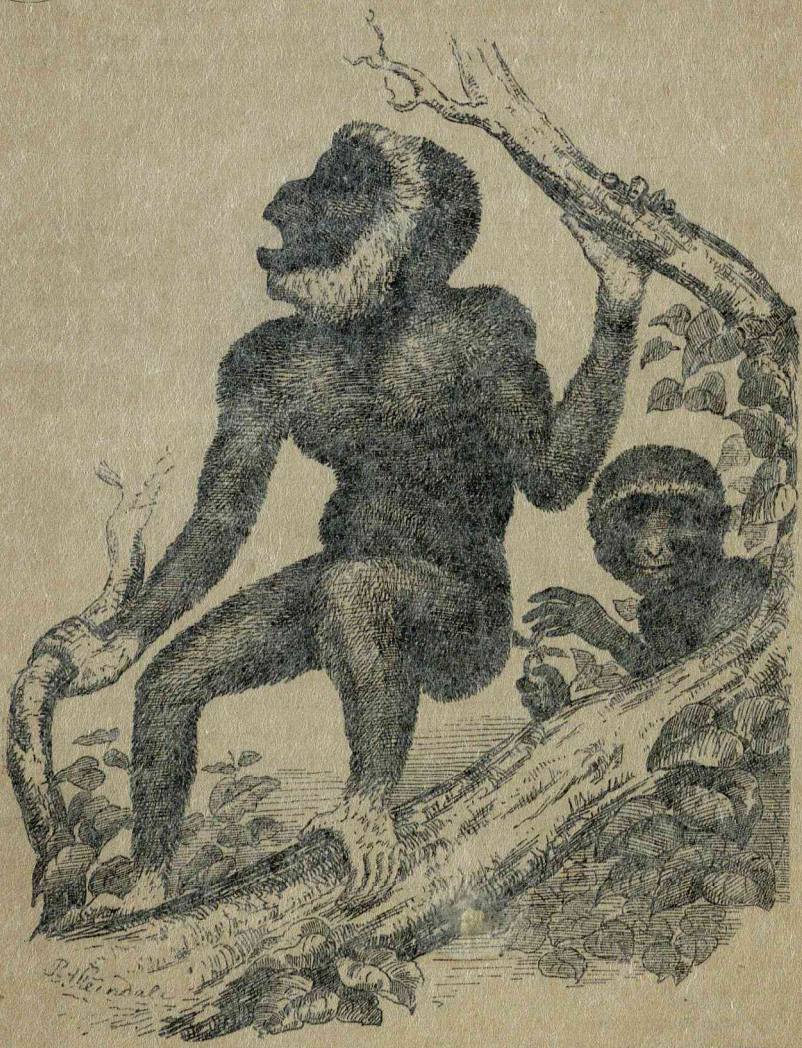
I think of all the monkey family this Gibbon makes one of the most interesting pets. It is mild and most docile, and capable of great attachment. Even the adult male has been caught, and within the short space of a month so completely tamed that he would follow and come to a call. One I had for a time, some years ago, was a most engaging little creature. Nothing contented him so much as being allowed to sit by my side with his arm linked through mine, and he would resist any attempt I made to go away. He was extremely clean in his habits, which cannot be said of all the monkey tribe. Soon after he came to me I gave him a piece of blanket to sleep on in his box, but the next morning I found he had rolled it up and made a sort of pillow for his head, so a second piece was given him. He was destined for the Queen's Gardens at Delhi, but unfortunately on his way up he got a chill, and contracted a disease akin to consumption. During his illness he was most carefully tended by my brother, who had a little bed made for him, and the doctor came daily to see the little patient, who gratefully accepted his attentions; but, to their disappointment, he died. The only objection to these monkeys as pets is the power they have of howling, or rather whooping, a piercing and somewhat hysterical "Whoop-poo! whoop-poo! whoop-poo!" for several minutes, till fairly exhausted.



Skull of *Hylobates hoolock*.

They are very fond of swinging by their long arms, and walk something like a tipsy sailor. A friend, resident on the frontiers of Assam, tells me that the full-grown adult pines and dies in confinement. I think it probable that it may miss a certain amount of insect diet, and would recommend those who cannot let their pets run loose in a garden to give them raw eggs and a little minced meat, and a spider or two occasionally.

In its wild state this Gibbon feeds on leaves, insects, eggs and small



HYLOBATES LAR. *HYLOBATES HOOLUCK.*

birds. Dr. Anderson notices the following as favourite leaves: *Moringa pterygosperma* (horse-radish tree), *Spondias mangifera* (amra), *Ficus religiosa* (the pipal), also *Beta vulgaris*; and it is specially partial to the *Ipomœa reptans* (the water convolvulus) and the bright-coloured flowers of the Indian shot (*Canna Indica*). Of insects it prefers spiders and the Orthoptera; eggs and small birds are also eagerly devoured.

No. 2. HYLOBATES LAR.

The White-handed Gibbon.

HABITAT.—Arracan, Lower Pegu, Tenasserim, and the Malayan Peninsula.

DESCRIPTION.—"This species is generally recognisable by its pale yellowish, almost white hands and feet, by the grey, almost white, supercilium, whiskers and beard, and by the deep black of the rest of the pelage."—*Anderson.*

SIZE.—About same as *H. hooluck.*

It is, however, found in every variety of colour, from black to brownish, and variegated with light-coloured patches, and occasionally of a fulvous white. For a long time I supposed it to be synonymous with *H. agilis* of Cuvier, or *H. variegatus* of Temminck, but both Mr. Blyth and Dr. Anderson separate it. Blyth mentions a significant fact in distinguishing the two Indian Gibbons, whatever be their variations of colour, viz.: "*H. hooluck* has constantly a broad white frontal band either continuous or divided in the middle, while *H. lar* has invariably white hands and feet, less brightly so in some, and a white ring encircling the visage, which is seldom incomplete."*

H. lar has sometimes the index and middle fingers connected by a web, as in the case of *H. syndactylus* (a Sumatran species very distinct in other respects). The very closely allied *H. agilis* has also this peculiarity in occasional specimens. This Gibbon was called "*agilis*" by Cuvier from its extreme rapidity in springing from branch to branch. Duvaucel says: "The velocity of its movements is wonderful; it escapes like a bird on the wing. Ascending rapidly to the top of a tree, it then seizes a flexible branch, swings itself two or three times to gain the necessary impetus, and then launches itself forward, repeatedly clearing in succession, without effort and without fatigue, spaces of forty feet."

Sir Stamford Raffles writes that it is believed in Sumatra that it is so jealous that if in captivity preference be given to one over another, the neglected one will die of grief; and he found that one he had sickened

* There is an excellent coloured drawing by Wolf of these two Gibbons in the 'Proceedings of the Zoological Society,' 1870, page 86, from which I have partly adapted the accompanying sketch.

under similar circumstances and did not recover till his rival (a Siamang, *H. syndactylus*) was removed.

No. 3. HYLOBATES SYNDACTYLUS.

The Siamang.

HABITAT.—Tenasserim Province, Sumatra, Malayan Peninsula.

DESCRIPTION.—A more robust and thick-set animal than the two last; deep, woolly, black fur; no white supercilium nor white round the face. The skull is distinguished from the skull of the other Gibbons, according to Dr. Anderson, by the greater forward projection of the supraorbital ridges, and by its much deeper face, and the occipital region more abruptly truncated than in the other species. The index and middle toes of the foot are united to the last phalange.

SIZE.—About three feet.

This Gibbon is included in the Indian group on the authority of Helfer, who stated it to be found in the southern parts of the Tenasserim province. Blyth mentions another distinguishing characteristic—it is not only larger than the other Gibbons, but it possesses an inflatable laryngeal sac. Its arms are immense—five feet across in an adult of three feet high.

The other species of this genus inhabiting adjacent and other countries are *H. pileatus* and *H. leucogenys* in Siam; *H. leuciscus*, Java; *H. Mulleri* and *H. concolor*, Borneo.

GENUS PRESBYTES—CUVIER'S GENUS SEMNOPITHECUS.

These monkeys are characterised by their slender bodies and long limbs and tails. Jerdon says the Germans call them Slim-apes. Other striking peculiarities are the absence of cheek pouches, which, if present, are but rudimentary. Then they differ from the true monkeys (*Cercopithecus*) by the form of the last molar tooth in the lower jaw, which has five tubercles instead of four; and, finally, they are to be distinguished by the peculiar structure of the stomach, which is singularly complicated, almost as much so as in the case of Ruminants, which have four divisions. The stomach of this genus of monkey consists of three divisions: 1st, a simple cardiac pouch with smooth parietes; 2nd, a wide sacculated middle portion; 3rd, a narrow elongated canal, sacculated at first, and of simple structure towards the termination. Cuvier from this supposes it to be more herbivorous than other genera, and considers this conclusion justified by the blunter tubercles of the molars and greater length of intestines and cœcum, all of which point

a vegetable diet. "The head is round, the face but little produced, having a high facial angle."—*Jerdon.*

But the *tout ensemble* of the *Langur* is so peculiar that no one who has once been told of a long, loosed-limbed, slender monkey with a prodigious tail, black face, with overhanging brows of long stiff black hair, projecting like a pent-house, would fail to recognise the animal.

The *Hanuman* monkey is reverenced by the Hindus. Hanuman was the son of Pavana, god of the winds; his strength was enormous, but in attempting to seize the sun he was struck by Indra with a thunderbolt which broke his jaw (*hanu*), whereupon his father shut himself up in a cave, and would not let a breeze cool the earth till the gods had promised his son immortality. Hanuman aided Rama in his attack upon Ceylon, and by his superhuman strength mountains were torn up and cast into the sea, so as to form a bridge of rocks across the Straits of Manar.*

The species of this genus of monkey abound throughout the Peninsula. All Indian sportsmen are familiar with their habits, and have often been assisted by them in tracking a tiger. Their loud whoops and immense bounds from tree to tree when excited, or the flashing of their white teeth as they gibber at their lurking foe, have often told the shikari of the whereabouts of the object of his search. The *Langurs* take enormous leaps, twenty-five feet in width, with thirty to forty in a drop, and never miss a branch. I have watched them often in the Central Indian jungles. Emerson Tennent graphically describes this: "When disturbed their leaps are prodigious, but generally speaking their progress is not made so much by *leaping* as by swinging from branch to branch, using their powerful arms alternately, and, when baffled by distance, flinging themselves obliquely so as to catch the lower boughs of an opposite tree, the momentum acquired by their descent being sufficient to cause a rebound of the branch that carries them upwards again till they can grasp a higher and more distant one, and thus continue their headlong flight."

Jerdon's statement that they can run with great rapidity on all-fours is qualified by McMaster, who easily ran down a large male on horseback on getting him out on a plain.

A correspondent of the *Asian*, quoting from the *Indian Medical Gazette* for 1870, states that experiments with one of this genus (*Presbytes entellus*) showed that strychnine has no effect on *Langurs*—as much as five grains were given within an hour without effect. "From a quarter to half of a grain will kill a dog in from five to ten minutes, and even one twenty-fourth of a grain will have a decided tetanic effect in human beings of delicate temperament."—*Cooley's Cycl.* Two days after *ten* grains of strychnine were dissolved in spirits of wine, and

* The legend, with native picture, is given in Wilkin's 'Hindoo Mythology.'

mixed with rum and water, cold but sweet, which the animal drank with relish, and remained unhurt.

The same experiment was tried with one of another genus (*Inuus rhesus*), who rejected the poisoned fruit at once, and on having strychnine in solution poured down his throat, died.

The *Langur* was then tried with cyanide of potassium, which he rejected at once, but on being forced to take a few grains, was dead in a few seconds.

Although we may not sympathize with those who practise such cruel experiments as these above alluded to, the facts elucidated are worth recording, and tend to prove the peculiar herbivorous nature of this genus, which, in common with other strictly herbivorous animals, instinctively knows what to choose and what to avoid, and can partake, without danger, of some of the most virulent vegetable poisons. It is possible that in the forests they eat the fruit of the *Strychnos nux-vomica*, which is also the favourite food of the pied hornbill (*Hydrocissa coronata*).

No. 4. SEMNOPITHECUS *vel* PRESBYTES ENTELLUS.

The Bengal Langur (*Jerdon's No.* 1).

NATIVE NAMES.—*Langur*, *Hanuman*, Hindi; *Wanur* and *Makur*, Mahratti; *Musya*, Canarese.

HABITAT.—Bengal and Central India.

DESCRIPTION.—Pale dirty or ashy grey; darker on the shoulders and rump; greyish-brown on the tail; paler on the head and lower parts; hands and feet black.

SIZE.—Length of male thirty inches to root of tail; tail forty-three inches.

The *Entellus* monkey is in some parts of India deemed sacred, and is permitted by the Hindus to plunder their grain-shops with impunity; but I think that with increasing hard times the *Hanumans* are not allowed such freedom as they used to have, and in most parts of India I have been in they are considered an unmitigated nuisance, and the people have implored the aid of Europeans to get rid of their tormentors. In the forest the *Langur* lives on grain, fruit, the pods of leguminous trees, and young buds and leaves. Sir Emerson Tennent notices the fondness of an allied species for the flowers of the red hibiscus (*H. rosa sinensis*). The female has usually only one young one, though sometimes twins. The very young babies have not black but light-coloured faces, which darken afterwards. I have always found them most difficult to rear, requiring almost as much attention as a human baby. Their diet and hours of feeding must be as systematically arranged; and if cow's milk be given it must be freely diluted with water—two-thirds to one-third milk when very young, and

terwards decreased to one-half. They are extremely susceptible to cold. In confinement they are quiet and gentle whilst young, but the old males are generally sullen and treacherous. Jerdon says, on the authority of the *Bengal Sporting Magazine* (August 1836), that the males live apart from the females, who have only one or two old males with each colony, and that they have fights at certain seasons, when the vanquished males receive charge of all the young ones of their own sex, with whom they retire to some neighbouring jungle. Blyth notices that in one locality he found only males of all ages, and in another

Presbytes entellus.

chiefly females. I have found these monkeys mostly on the banks of streams in the forests of the Central Provinces; in fact, the presence of them anywhere in arid jungles is a sign that water is somewhere in the vicinity. They are timid creatures, and I have never seen the slightest disposition about them to show fight, whereas I was once most deliberately charged by the old males of a party of *Rhesus* monkeys. I was at the time on field service during the Mutiny, and, seeing several nursing mothers in the party, tried to run them down in the open and secure a baby; but they were too quick for me, and, on being attacked by the old males, I had to pistol the leader.

No. 5. SEMNOPITHECUS *vel* PRESBYTES SCHISTACEUS.*

The Himalayan Langur (Jerdon's No. 2).

NATIVE NAMES.—*Langur*, Hindi; *Kamba Suhú*, Lepcha; *Kubup*, Bhotia.

HABITAT.—The whole range of the Himalayas from Nepal to beyond Simla.

DESCRIPTION (after Hodgson).—Dark slaty above; head and lower parts pale yellowish; hands concolorous with body, or only a little darker; tail slightly tufted; hair on the crown of the head short and radiated; on the cheeks long, directed backwards, and covering the ears. Hutton's description is, dark greyish, with pale hands and feet, white head, dark face, white throat and breast, and white tip to the tail.

SIZE.—About thirty inches; tail, thirty-six inches.

Captain Hutton, writing from Mussoorie, says: "On the Simla side I observed them also, leaping and playing about, while the fir-trees, among which they sported, were loaded with snow-wreaths, at an elevation of 11,000 feet."—'Jour. As. Soc. Beng.' xiii. p. 471.

Dr. Anderson remarks on the skull of this species, that it can be easily distinguished from *entellus* by its larger size, the supraorbital ridge being less forwardly projected, and not forming so thick and wide a pent roof, but the most marked difference lies in the much longer facial portion of *schistaceus*; the teeth are also larger; the symphysis or junction of the lower jaw is considerably longer and broader, and the lower jaw itself is generally more massive and deep.

No. 6. SEMNOPITHECUS *vel* PRESBYTES PRIAMUS.

The Madras Langur.

NATIVE NAME.—*Gandangi*, Telugu.

HABITAT.—The Coromandel Coast and Ceylon.

DESCRIPTION.—Ashy grey, with a pale reddish or *chocolat-au-lait* tint overlying the whole back and head; sides of the head, chin, throat, and beneath pale yellowish; hands and feet whitish; face, palms and fingers,

* Mr. J. Cockburn, of the Imperial Museum, has, since I wrote about the preceding species, given me some interesting information regarding the geographical distribution of *Presbytes entellus* and *Hylobates hooluck*. He says: "The latter has never been known to occur on the north bank of the Brahmaputra, though swarming in the forests at the very water's edge on the south bank. The *entellus* monkey is also not found on the north bank of the Ganges, and attempts at its introduction have repeatedly failed." *P. schistaceus* replaces it in the Sub-Himalayan forests.

and soles of feet and toes black; hair long and straight, not wavy; tail the colour of the darker portion of the back, ending in a whitish tuft.—*Jerdon.*

SIZE.—About the same as *P. entellus.*

Blyth, who is followed by Jerdon, describes this monkey as having a compressed high vertical crest, but Dr. Anderson found that the specimens in the Indian Museum owed these crests to bad stuffing. Kellaart, however, mentions it, and calls the animal "the Crested Monkey." In Sir Emerson Tennent's figure of *P. priamus* a slight crest is noticeable; but Kellaart is very positive on this point, saying: "*P. priamus* is easily distinguished from all other known species of monkeys in Ceylon by its high compressed vertical crest."

Jerdon says this species is not found on the Malabar Coast, but neither he nor McMaster give much information regarding it. Emerson Tennent writes: "At Jaffna, and in other parts of the island where the population is comparatively numerous, these monkeys become so familiarised with the presence of man as to exhibit the utmost daring and indifference. A flock of them will take possession of a palmyra palm, and so effectually can they crouch and conceal themselves among the leaves that, on the slightest alarm, the whole party becomes invisible in an instant. The presence of a dog, however, excites such irrepressible curiosity that, in order to watch his movements, they never fail to betray themselves. They may be frequently seen congregated on the roof of a native hut; and, some years ago, the child of a European clergyman, stationed near Jaffna, having been left on the ground by the nurse, was so teased and bitten by them as to cause its death."

In these particulars this species resembles *P. entellus.*

No. 7. SEMNOPITHECUS *vel* PRESBYTES JOHNII.

The Malabar Langur (Jerdon's No. 4).

HABITAT.—The Malabar Coast, from N. Lat. 14° or 15° to Cape Comorin.

DESCRIPTION.—Above dusky brown, slightly paling on the sides; crown, occiput, sides of head and beard fulvous, darkest on the crown; limbs and tail dark brown, almost black; beneath yellowish white.—*Jerdon.*

SIZE.—Not quite so large as *P. entellus.*

This monkey was named after a member of the Danish factory at Tranquebar, M. John, who first described it. It abounds in forests, and does not frequent villages, though it will visit gardens and fields, where, however, it shuns observation.

The young are of a sooty brown, or nearly black, without any indication of the light-coloured hood of the adult.

No. 8. SEMNOPITHECUS *vel* PRESBYTES JUBATUS.

The Nilgheri Langur (*Jerdon's No.* 5).

HABITAT.—The Nilgheri Hills, the Animallies, Pulneys, the Wynaad, and all the higher parts of the range of the Ghâts as low as Travancore.

DESCRIPTION.—Dark glossy black throughout, except head and nape, which are reddish brown; hair very long; in old individuals a greyish patch on the rump.—*Jerdon.*

SIZE.—Length of head and body, 26 inches; tail, 30.

This monkey does not, as a rule, descend lower than 2,500 to 3,000 feet; it is shy and wary. The fur is fine and glossy, and is much prized (Jerdon). Its flesh is excellent food for dogs (McMaster).

Dr. Anderson makes this synonymous with the last.

No. 9. SEMNOPITHECUS *vel* PRESBYTES PILEATUS.

The Capped Langur.

HABITAT.—Assam, Chittagong, Tipperah.

DESCRIPTION.—General colour dark ashy grey, with a slight ferruginous tint; darker near head and on shoulders; underneath and on the inside of the limbs pale yellowish, with a darker shade of orange or golden yellow on the breast and belly. The crown of the head is densely covered with bristly hairs, regularly disposed and somewhat elongated on the vertex so as to resemble a cap, whence the name. Along the forehead is a superciliary crest of long black bristles, directed outwardly; whiskers full and down to the chin: behind the ears is a small tuft of white hairs; the tail is long, one third longer than the body, darker near the end, and tufted; fingers and toes black.

SIZE.—A little smaller than *P. entellus.*

This monkey is found in Northern Assam, Tipperah and southwards to Tenasserim; in Blyth's 'Catalogue of the Mammals of Burmah' it is mentioned as *P. chrysogaster* (*Semnopithecus potenziani* of Bonaparte and Peters). He writes of it: "Females and young have the lower parts white, or but faintly tinted with ferruginous, and the rest of the coat is of a pure grey; the face black, and there is no crest, but the hairs of the crown are so disposed as to appear like a small flat cap laid upon the top of the head. The old males seem always to be of a deep rust-colour on the cheeks, lower parts, and more or less on the outer

side of the limbs; while in old females this rust colour is diluted or little more than indicated."

Dr. Anderson says that a young one he had was of a mild disposition, which however is not the character of the adult animal, which is uncertain, and the males when irritated are fierce, and determined in attack. No rule, however, is without its exception, for one adult male, possessed by Blyth, is reported as having been an exceeding gentle animal.

No. 10. SEMNOPITHECUS *vel* PRESBYTES BARBEI.

The Tipperah Langur.

HABITAT.—Tipperah, Tenasserim.

DESCRIPTION.—No vertical crest of hair on the head, nor is the occipital hair directed downwards, as in the next species. Shoulders and outside of arm silvered; tail slightly paler than body, "which is of a blackish fuliginous hue."

More information is required about this monkey, which was named by Blyth after its donor to the Asiatic Society, the Rev. J. Barbe. Blyth considered it as distinct from *P. Phayrei* and *P. obscurus*, which last is from Malacca.

Dr. Anderson noticed it in the valley of the Tapeng in the centre of the Kakhyen Hills, in troops of thirty to fifty, in high forest trees overhanging the mountain streams. Being seldom disturbed, they permitted a near approach.

No. 11. SEMNOPITHECUS *vel* PRESBYTES PHAYREI.

Syn.—SEMNOPITHECUS CRISTATUS.

The Silvery-Leaf Monkey (Blyth).

HABITAT.—Arracan, Malayan Peninsula, Sumatra, Borneo.

DESCRIPTION.—Colour dusky grey-brown above, more or less dark, with black hands and feet; a conspicuous crest on the vertex; under parts white, scarcely extending to the inside of the limbs; sides grey like the back; whiskers dark, very long, concealing the ears in front; lips and eyelids conspicuously white, with white moustachial hairs above and similar hairs below.

SIZE.—Two feet; tail, 2 feet 6 inches.

This monkey was named by Blyth after Captain (now Sir Arthur) Phayre, who first brought it to his notice; but he afterwards reconciled it as being synonymous with *Semnopithecus cristatus*. The

colouring, according to different authors, seems to vary considerably, which causes some confusion in description. It differs from an allied species, *S. maurus*, in selecting low marshy situations near the banks of streams. Its favourite food is the fruit of the Nibong palm (*Oncosperma filamentosa*).

No. 12. SEMNOPITHECUS *vel* PRESBYTES OBSCURUS.

The Dusky-Leaf Monkey.

HABITAT.—Mergui and the Malayan Peninsula.

DESCRIPTION.—Adults ashy or brownish black, darker on forehead, sides of face, shoulder, and sides of body; the hair on the nape is lengthened and whitish. The newly-born young are of a golden ferruginous colour, which afterward changes to dusky-ash colour, the terminal half of the tail being last to change; the mouth and eyelids are whitish, but the rest of the face black.

SIZE.—Body, 1 foot 9 inches; tail, 2 feet 8 inches.

This monkey is most common in the Malayan Peninsula, but has been found to extend to Mergui, where Blyth states it was procured by the late Major Berdmore. Dr. Anderson says it is not unfrequently offered for sale in the Singapore market.

No. 13. SEMNOPITHECUS *vel* PRESBYTES CEPHALOPTERUS.

The Ceylon Langur.

NATIVE NAME.—*Kallu Wanderu.*

HABITAT.—The low lands of Ceylon.

DESCRIPTION.—General colour cinereous black; croup and inside of thighs whitish; head rufescent brown; hair on crown short, semi-erect; occipital hairs long, albescent; whiskers white, thick and long, terminating at the chin in a short beard, and laterally angularly pointed; upper lip thinly fringed with white hairs; superciliary hairs black, long, stiff and standing erect; tail albescent and terminating in a beard tuft; face, palms, soles, fingers, toes and callosities black; irides brown.—*Kellaart.*

SIZE.—Length, 20 inches; tail 24 inches.

Sir E. Tennent says of this monkey that it is never found at a higher elevation than 1,300 feet (when it is replaced by the next species).

"It is an active and intelligent creature, little larger than the common bonneted macaque, and far from being so mischievous as others of the monkeys in the island. In captivity it is remarkable for the gravity of its demeanour and for an air of melancholy in its expression and

movements, which are completely in character with its snowy beard and venerable aspect. In disposition it is gentle and confiding, sensible in the highest degree of kindness, and eager for endearing attention, uttering a low plaintive cry when its sympathies are excited. It is particularly cleanly in its habits when domesticated, and spends much of its time in trimming its fur and carefully divesting its hair of particles of dust. Those which I kept at my house near Colombo were chiefly fed upon plantains and bananas, but for nothing did they evince a greater partiality than the rose-coloured flowers of the red hibiscus (*H. rosa sinensis*). These they devoured with unequivocal gusto; they likewise relished the leaves of many other trees, and even the bark of a few of the more succulent ones."

No. 14. SEMNOPITHECUS *vel* PRESBYTES URSINUS.

The Great Wanderu.

NATIVE NAME.—*Maha Wanderu.*

HABITAT.—The mountainous district of Ceylon.

DESCRIPTION.—Fur long, almost uniformly greyish black; whiskers full and white; occiput and croup in old specimens paler coloured; hands and feet blackish; tail long, getting lighter towards the lower half. The young and adults under middle age have a rufous tint, corresponding with that of the head of all ages.

SIZE.—Body about 22 inches; tail, 26 inches.

The name Wanderu is a corruption of the Singhalese generic word for monkey, *Ouandura*, or *Wandura*, which bears a striking resemblance to the Hindi *Bandra*, commonly called *Bandar*—*b* and *v* being interchangeable—and is evidently derived from the Sanscrit *Banur*, which in the south again becomes *Wanur*, and further south, in Ceylon, *Wandura*. There has been a certain amount of confusion between this animal and *Inuus silenus*, the lion monkey, which had the name *Wanderu* applied to it by Buffon, and it is so figured in Cuvier. They are both large monkeys, with great beards of light coloured hair, but in no other respect do they resemble. Sir Emerson Tennent says: "It is rarely seen by Europeans, this portion of the country having till very recently been but partially opened; and even now it is difficult to observe its habits, as it seldom approaches the few roads which wind through these deep solitudes. At early morning, ere the day begins to dawn, its loud and peculiar howl, which consists of quick repetition of the sound *how-how!* may be frequently heard in the mountain jungles, and forms one of the characteristic noises of these lofty situations." This was written in 1861; since then much of the mountainous forest land has been cleared for coffee-planting, and the Wanderu either

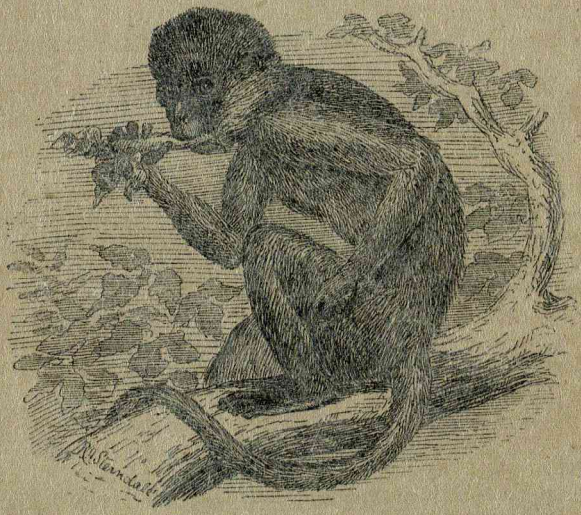
driven into corners or become more familiarised with man. More therefore must be known of its habits by this time, and information regarding it is desirable.

No. 15. SEMNOPITHECUS *vel* PRESBYTES THERSITES.

NATIVE NAME.—*Ellee Wanderu* (Kellaart).

HABITAT.—Ceylon.

DESCRIPTION.—Chiefly distinguished from the others by wanting the head tuft; uniform dusky grey, darker on crown and fore-limbs; slaty brown on wrists and hands; hair on toes whitish; whiskers and beard largely developed and conspicuously white.



Presbytes thersites.

The name was given by Blyth to a single specimen forwarded by Dr. Templeton, and it was for a time doubtful whether it was really a native, till Dr. Kellaart procured a second. Dr. Templeton's specimen was partial to fresh vegetables, plantains, and fruit, but he ate freely boiled rice, beans, and gram. He was fond of being noticed and petted, stretching out his limbs in succession to be scratched, drawing himself up so that his ribs might be reached by the finger, closing his eyes during the operation, and evincing his satisfaction by grimaces irresistibly ludicrous.—*Emerson Tennent.*

Dr. Anderson considers this monkey as identical with *Semnopithecus priamus*, but Kellaart, as I have before stated, is very positive on the point of difference, calling *S. priamus* emphatically the crested monkey, and alleging that *thersites* has no crest, and it is probable he had opportunities of observing the two animals in life; he says he had a young specimen of *priamus*, which distinctly showed the crest, and a young *thersites* of the same age which showed no sign of it.

In Emerson Tennent's 'Natural History of Ceylon,' (1861) page 5, there is a plate of a group in which are included *priamus* and *thersites*; in the original they are wrongly numbered—the former should be 2 and not 3, and the latter 3 and not 2. If these be correct (and Wolf's name should be a voucher for their being so) there is a decided difference. There is no crest in the latter, and the white whiskers terminate abruptly on a level with the eyebrow, and the superciliary ridge of hair is wanting.

No. 16. SEMNOPITHECUS *vel* PRESBYTES ALBINUS (*Kellaart*).

The White Langur.

HABITAT.—Ceylon, in the hills beyond Matelle.

DESCRIPTION.—Fur dense, sinuous, nearly of uniform white colour, with only a slight dash of grey on the head; face and ears black; palm, soles, fingers and toes flesh-coloured; limbs and body the shape of *P. ursinus*; long white hairs prolonged over the toes and claws, giving the appearance of a white spaniel dog to this monkey; irides brown; whiskers white, full, and pointed laterally.—*Kellaart.*

The above description was taken by Dr. Kellaart from a living specimen. He considered it to be a distinct species, and not an Albino, from the black face and ears and brown eyes.

The Kandyans assured him that they were to be seen (rarely however) in small parties of three and four over the hills beyond Matelle, but never in company with the dark kind.

Emerson Tennent also mentions one that was brought to him taken between Ambepasse and Kornegalle, where they were said to be numerous; except in colour it had all the characteristics of *P. cephalopterus*. So striking was its whiteness that it might have been conjectured to be an Albino, but for the circumstance that its eyes and face were black. An old writer of the seventeenth century, Knox, says of the monkeys of Ceylon (where he was captive for some time) that there are some "milk-white in body and face, but of this sort there is not such plenty." —*Tennent's 'Natural History of Ceylon,' page* 8.

NOTE.—Since the above was in type I have found in the List of Animals in the Zoological Society's Gardens, a species entered as *Semnopithecus leucoprymnus*, the Purple-faced Monkey from Ceylon—see P.Z.S.

PAPIONINÆ.

This sub-family comprises the true baboons of Africa and the monkey-like baboons of India. They have the stomach simple, and cheek-pouches are always present. According to Cuvier they possess, like the last family, a fifth tubercle on their last molars. They produce early, but are not completely adult for four or five years; the period of gestation is seven months.

The third sub-family of *Simiadæ* consists of the genera *Cercopithicus*, *Macacus*, and *Cynocephalus*, as generally accepted by modern zoologists, but Jerdon seems to have followed Ogilby in his classification, which merges the long-tailed Macaques into *Cercopithecus*, and substituting *Papio* for the others.

GENUS INUUS.

Cuvier applies this term to the Magots or rudimentary-tailed Macaques. The monkeys of this genus are more compactly built than those of the last. They are also less herbivorous in their diet, eating frogs, lizards, crabs and insects, as well as vegetables and fruit. Their callosities and cheek-pouches are large, and they have a sac which communicates with the larynx under the thyroid cartilage, which fills with air when they cry out.

Some naturalists of the day, however, place all under the generic name Macacus.

Macacus silenus.

No. 17. INUUS *vel* MACACUS SILENUS.

The Lion Monkey (*Jerdon's No.* 6).

NATIVE NAMES.—*Nil bandar*, Bengali; *Shia bandar*, Hindi; *Nella manthi*, Malabari.

HABITAT.—The Western Ghâts of India from North Lat. 14° to the extreme south, but most abundant in Cochin and Travancore (*Jerdon*), also Ceylon (*Cuvier* and *Horsfield*), though not confirmed by Emerson Tennent, who states that the *silenus* is not found in the island except

is introduced by Arab horse-dealers occasionally, and that it certainly is not indigenous. Blyth was also assured by Dr. Templeton of Colombo that the only specimens there were imported.

DESCRIPTION.—Black, with a reddish-white hood or beard surrounding the face and neck; tail with a tuft of whitish hair at the tip; a little greyish on the chest.

SIZE.—About 24 inches; tail, 10 inches.

There is a plate of this monkey in Carpenter and Westwood's edition of Cuvier, under the mistaken name of *Wanderoo*.

It is somewhat sulky and savage, and is difficult to get near in a wild state. Jerdon states that he met with it only in dense unfrequented forest, and sometimes at a considerable elevation. It occurs in troops of from twelve to twenty.

No. 18. INUUS *vel* MACACUS RHESUS.

The Bengal Monkey (*Jerdon's No.* 7).

NATIVE NAMES. — *Bandar*, Hindi; *Markot*, Bengali; *Suku*, Lepcha, *Piyu*, Bhotia.

HABITAT. — India generally from the North to about Lat. 18° or 19°; but not in the South, where it is replaced by *Macacus radiatus*.

DESCRIPTION.—Above brownish ochrey or rufous; limbs and beneath ashy-brown; callosities and adjacent parts red; face of adult males red.

SIZE. — Twenty-two inches; tail 11 inches.

Macacus rhesus.

This monkey is too well-known to need description. It is the common acting monkey of the *bandar-wallas*, the delight of all Anglo-Indian children, who go into raptures over the romance of *Munsur-ram* and *Chameli*, their quarrels, parting, and reconciliation, so admirably acted by these miniature comedians.

NOTE.—For *Macacus rheso-similis*, Sclater, see P.Z.S. 1872, p. 495, pl. XXV., also P.Z.S. 1875, p. 418.

No. 19. INUUS *vel* MACACUS PELOPS. *Syn.*—MACACUS ASSAMENSIS.

The Hill Monkey (*Jerdon's No.* 8).

HABITAT.—The Himalayan ranges and Assam.

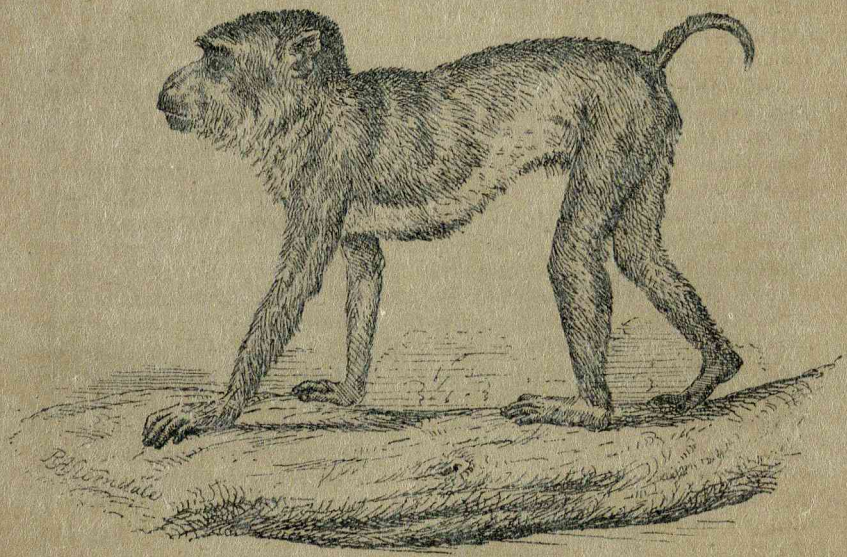
DESCRIPTION.—Brownish grey, somewhat mixed with slaty, and rusty brownish on the shoulders in some; beneath light ashy brown; fur fuller and more wavy than in *rhesus*; canine teeth long; of stout habit; callosities and face less red than in the last species (*Jerdon*). Face flesh-coloured, but interspersed with a few black hairs (*McClelland*).

No. 20. INUUS *vel* MACACUS NEMESTRINUS.

The Pig-tailed Monkey.

HABITAT.—Tenasserim and the Malay Archipelago.

DESCRIPTION.—General colour grizzled brown; the piles annulated



Macacus nemestrinus.

with dusky and fulvous; crown darker, and the middle of the back also darker; the hair lengthened on the fore-quarters; the back stripe extends

along the tail, becoming almost black; the tail terminates in a bright ferruginous tuft. This monkey is noted for its docility, and in Bencoolen is trained to be useful as well as amusing. According to Sir Stamford Raffles it is taught to climb the cocoa palms for the fruit for its master, and to select only those that are ripe.

No. 21. INUUS *vel* MACACUS LEONINUS.

The Long-haired Pig-tailed Monkey.

HABITAT.—Arracan.

DESCRIPTION.—A thick-set powerful animal, with a broad, rather flattened head above, and a moderately short, well clad, up-turned tail, about one-third the length of the body and head; the female smaller. —*Anderson.*

Face fleshy brown; whitish round the eyes and on the forehead; eyebrows brownish, a narrow reddish line running out from the external angle of the eye. The upper surface of the head is densely covered with short dark fur, yellowish brown, broadly tipped with black; the hair radiating from the vertex; on and around the ear the hair is pale grey; above the external orbital angle and on the sides of the face the hair is dense and directed backwards, pale greyish, obscurely annulated with dusky brown, and this is prolonged downwards to the middle of the throat. On the shoulders, back of the neck, and upper part of the thighs, the hairs are very long, fully three inches in the first-mentioned localities; the basal halves greyish; and the remainder ringed with eleven bands of dark brown and orange; the tips being dark. The middle and small of the back is almost black, the shorter hair there being wholly dark; and this colour is prolonged on the tail, which is tufted. The hair on the chest is annulated, but paler than on the shoulders, and it is especially dense on the lower part. The lower halves of the limbs are also well clad with annulated fur, like their outsides, but their upper halves internally and the belly are only sparsely covered with long brownish grey plain hairs, not ringed.

The female differs from the male in the absence of the black on the head and back, and in the hair of the under parts being brownish grey, without annulations. The shoulders somewhat brighter than the rest of the fur, which is yellowish olive; greyish olive on outside of limbs; dusky on upper surface of hands and feet; and black on upper surface of tail.

SIZE.—Length of male, head and body 23 inches; tail, without hair, 8 inches; with hair 10 inches.

The above description is taken from Dr. Anderson's account, 'Anat. and Zool. Res.,' where at page 54 will be found a plate of the skull show-

in the powerful canine teeth. Blyth mentions a fine male with hair on the shoulders four to five inches long.

No. 22. INUUS *vel* MACACUS ARCTOIDES.

The Brown Stump-tailed Monkey.

HABITAT.—Cachar, Kakhyen Hills, east of Bhamó.

DESCRIPTION.—Upper surface of head and along the back dark brown, almost blackish; sides and limbs dark brown; the hair, which is very long, is ringed with light yellowish and dark brown, darker still at the tips; face red; tail short and stumpy, little over an inch long.

This monkey is one over which many naturalists have argued; it is synonymous with *Macacus speciosus*, *M. maurus*, *M. melanotus*, and was thought to be with *M. brunneus* till Dr. Anderson placed the latter in a separate species on account of the non-annulation of its hair. It is essentially a denizen of the hills; it has been obtained in Cachar and in Upper Assam. Dr. Anderson got it in the Kakhyen Hills on the frontier of Yunnan, beyond which, he says, it spreads to the south-east to Cochin-China.

No. 23. INUUS *vel* MACACUS THIBETANUS.

The Thibetan Stump-tailed Monkey.

DESCRIPTION.—Head large and whiskered; form robust; tail stumpy and clad; general colour of the animal brown; whiskers greyish; face nude and flesh-coloured, with a deep crimson flush round the eyes.

SIZE.—Two feet 9 inches; tail about 3 inches.

This large monkey, though not belonging to British India, inhabiting, it is said, "the coldest and least accessible forests of Eastern Thibet," is mentioned here, as the exploration of that country by travellers from India is attracting attention.

GENUS MACACUS.

Tail longer than in *Inuus*, and face not so lengthened; otherwise as in that genus.—*Jerdon.*

No. 24. MACACUS RADIATUS.

The Madras Monkey (*Jerdon's No.* 9).

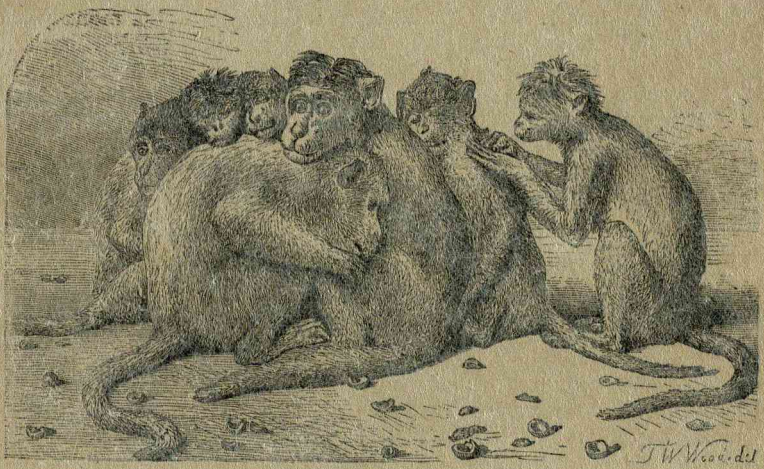
NATIVE NAMES.—*Bandar*, Hindi; *Makadu* or *Wanur*, Mahratti; *Kerda mahr* of the Ghâts; *Munga*, Canarese; *Koti*, Telegu; *Vella munthi*, Malabar.

HABITAT.—All over the southern parts of India, as far north as Lat. 18°.

DESCRIPTION.—Of a dusky olive brown, paler and whitish underneath, ashy on outer sides of limbs; tail dusky brown above, whitish beneath; hairs on the crown of the head radiated.

SIZE.—Twenty inches; tail 15 inches.

Elliott remarks of this monkey that it inhabits not only the wildest jungles, but the most populous towns, and it is noted for its audacity in stealing fruit and grain from shops. Jerdon says: "It is the monkey most commonly found in menageries, and led about to show various



Macacus radiatus and *Macacus pileatus*.

tricks and feats of agility. It is certainly the most inquisitive and mischievous of its tribe, and its powers of mimicry are surpassed by none." It may be taught to turn a wheel regularly; it smokes tobacco without inconvenience.—*Horsfield.*

No. 25. MACACUS PILEATUS (*vel* SINICUS, *Lin.*).

The Capped Monkey, or *Bonneted Macaque* of *Cuvier*.

NATIVE NAME.—*Rilawa*, Singhalese.

HABITAT.—Ceylon and China.

DESCRIPTION.—Yellowish brown, with a slight shade of green in old specimens; in some the back is light chestnut brown; yellowish brown hairs on the crown of the head, radiating from the centre to the circum-

face; face flesh-coloured and beardless; ears, palms, soles, fingers, and toes blackish; irides reddish brown; callosities flesh-coloured; tail longish, terminating in short tuft.—*Kellaart.*

SIZE.—Head and body about 20 inches; tail 18 inches.

This is the *Macacus sinicus* of Cuvier, and is very similar to the last species. In Ceylon it takes the place of our rhesus monkey with the conjurors, who, according to Sir Emerson Tennent, "teach it to dance, and in their wanderings carry it from village to village, clad in a grotesque dress, to exhibit its lively performances." It also, like the last, smokes tobacco; and one that belonged to the captain of a tug steamer, in which I once went down from Calcutta to the Sandheads, not only smoked, but chewed tobacco. Kellaart says of it: "This monkey is a lively, spirited animal, but easily tamed; particularly fond of making grimaces, with which it invariably welcomes its master and friends. It is truly astonishing to see the large quantity of food it will cram down its cheek pouches for future mastication."

No. 26. MACACUS CYNOMOLGUS.

The Crab-eating Macaque.

NATIVE NAME.—*Kra*, Malay.

HABITAT.—Tenasserim, Nicobars, Malay Archipelago.

Macacus cynomolgus.

DESCRIPTION.—"The leading features of this animal are its massive form, its large head closely set on the shoulders, its stout and rather

short legs, its slender loins and heavy buttocks, its tail thick at the base" (Anderson). The general colour is similar to that of the Bengal rhesus monkey, but the skin of the chest and belly is bluish, the face livid, with a white area between the eyes and white eyelids. Hands and and feet blackish.

SIZE.—About that of the Bengal rhesus.

According to Captain (now Sir Arthur) Phayre "these monkeys frequent the banks of salt-water creeks and devour shell-fish. In the cheek-pouch of the female were found the claws and body of a crab. There is not much on record concerning the habits of this monkey in its wild state beyond what is stated concerning its partiality for crabs, which can also, I believe, be said of the rhesus in the Bengal Sunderbunds."

No. 27. MACACUS CARBONARIUS.

The Black-faced Crab-eating Monkey.

HABITAT.—Burmah.

DESCRIPTION.—In all respects the same as the last, except that its face is blackish, with conspicuously white eyelids.

FAMILY LEMURIDÆ.

The Indian members of this family belong to the sub-family named by Geoffroy *Nycticebinæ*.

GENUS NYCTICEBUS.

No. 28. NYCTICEBUS TARDIGRADUS.

The Slow-paced Lemur (*Jerdon's No.* 10).

NATIVE NAME.—*Sharmindi billi*, Hindi.

HABITAT.—Eastern Bengal, Assam, Garo Hills, Sylhet, Arracan.—*Horsfield.*

DESCRIPTION.—Dark ashy grey, with a darker band down middle of back, beneath lighter grey; forehead in some dark, with a narrow white stripe between the eyes, disappearing above them; ears and round the eye dark; tail very short.—*Jerdon.*

SIZE.—Length about 14 to 15 inches; tail $\frac{5}{8}$ of an inch.

Nocturnal in its habits; sleeping during the day in holes of trees, and coming out to feed at night. Sir William Jones describes one kept by him for some time; it appeared to have been gentle, though at times petulant when disturbed; susceptible of cold; slept from sunrise to

set rolled up like a hedgehog. Its food was chiefly plantains and mangoes when in season. Peaches, mulberries, and guavas, it did not so much care for, but it was most eager after grasshoppers, which it devoured voraciously. It was very particular in the performance of its

Loris gracilis and *Nycticebus tardigradus*.

toilet, cleaning and licking its fur. Cuvier also notices this last peculiarity, and with regard to its diet says it eats small birds as well as insects. These animals are occasionally to be bought in the Calcutta market. A friend of mine had a pair which were a source of great amusement to his guests after dinner. (See Appendix C, p. 526.)

GENUS LORIS.

Body and limbs slender; no tail; eyes very large, almost contiguous; nose acute.

No. 29. LORIS GRACILIS.

The Slender Lemur (*Jerdon's No.* 11).

NATIVE NAMES.—*Tevangar*, Tamil; *Dewantsipilli*, Telegu. (*Oona happslava*, Singhalese.—*Kellaart.*)

HABITAT.—Southern India and Ceylon.

DESCRIPTION.—Above greyish rufescent (tawny snuff brown: Kellaart); beneath a paler shade; a white triangular spot on forehead, extending down the nose; fur short, dense, and soft; ears thin, rounded (Jerdon). A hooped claw on inner toes; nails of other toes flat; posterior third of palms and soles hairy (Kellaart).

SIZE.—About 8 inches; arm, 5; leg, $5\frac{1}{2}$.

This, like the last, is also nocturnal in its habits, and from the extreme slowness of its movements is called in Ceylon "the Ceylon sloth." Its diet is varied—fruit, flower, and leaf buds, insects, eggs, and young birds. Sir Emerson Tennent says the Singhalese assert that it has been known to strangle pea-fowl at night and feast on the brain, but this I doubt. Smaller birds it might overcome. Jerdon states that in confinement it will eat boiled rice, plantains, honey or syrup and raw meat. McMaster, at page 6 of his 'Notes on Jerdon,' gives an interesting extract from an old account of 'Dr. John Fryer's Voyage to East India and Bombain,' in which he describes this little animal as "Men of the Woods, or more truly Satyrs;" asleep during the day; but at "Night they Sport and Eat." "They had Heads like an owl. Bodied like a monkey without Tails. Only the first finger of the Right Hand was armed with a claw like a bird, otherwise they had hands and feet which they walk upright on, not pronely, as other Beasts do."

These little creatures double themselves up when they sleep, bending the head down between their legs. Although so sluggish generally, Jerdon says they can move with considerable agility when they choose.

SUB-ORDER PLEUROPTERA.—FAMILY GALÆOPITHECIDÆ.

There is a curious link between the Lemurs and the Bats in the Colugos (*Galæopithecus*): their limbs are connected with a membrane as in the Flying Squirrels, by which they can leap and float for a hundred yards on an inclined plane. They are mild, inoffensive animals, subsist-

is on fruits and leaves. Cuvier places them after the Bats, but they seem properly to link the Lemurs and the frugivorous Bats. As yet they have not been found in India proper, but are common in the Malayan Peninsula, and have been found in Burmah.

No. 30. GALÆOPITHECUS VOLANS

The Flying Lemur.

NATIVE NAME.—*Myook-hloung-pyan*, Burmese.
HABITAT.—Mergui; the Malayan Peninsula.
DESCRIPTION.—Fur olive brown, mottled with irregular whitish spots

Galæopithecus volans.

and blotches; the pile is short, but exquisitely soft; head and brain very small; tail long and prehensile. The membrane is continued from each side of the neck to the fore feet; thence to the hind feet, again to

the tip of the tail. This animal is also nocturnal in its habits, and very sluggish in its motions by day, at which time it usually hangs from a branch suspended by its fore hands, its mottled back assimilating closely with the rugged bark of the tree; it is exclusively herbivorous, possessing a very voluminous stomach, and long convoluted intestines. Wallace says of it, that its brain is very small, and it possesses such tenacity of life that it is very difficult to kill; he adds that it is said to have only one at a birth, and one he shot had a very small blind naked little creature clinging closely to its breast, which was quite bare and much wrinkled. Raffles, however, gives two as the number produced at each birth. Dr. Cantor says that in confinement plantains constitute the favourite food, but deprived of liberty it soon dies. In its wild state it "lives entirely on young fruits and leaves; those of the cocoanut and *Bombax pentandrum* are its favourite food, and it commits great injury to the plantations of these."—*Horsfield's* 'Cat. Mam.' Regarding its powers of flight, Wallace, in his 'Travels in the Malay Archipelago,' says: "I saw one of these animals run up a tree in a rather open space, and then glide obliquely through the air to another tree on which it alighted near its base, and immediately began to ascend. I paced the distance from one tree to the other, and found it to be seventy yards, and the amount of descent not more than thirty-five or forty feet, or less than one in five. This, I think, proves that the animal must have some power of guiding itself through the air, otherwise in so long a distance it would have little chance of alighting exactly upon the trunk."

There is a carefully prepared skeleton of this animal in the Indian Museum in Calcutta.

ORDER CARNARIA.

CHEIROPTERA.

IT may seem strange to many that such an insignificant, weird little creature as a bat should rank so high in the animal kingdom as to be but a few removes from man. It has, however, some striking anatomical affinities with the last Order, *Quadrumana*, sufficient to justify its being placed in the next link of the great chain of creation.

"Bats have the arms, fore-arms and fingers excessively elongated, so as to form with the membrane that occupies their intervals, real wings, the surface of which is equally or more extended than in those of birds. Hence they fly high and with great rapidity."—*Cuvier*. They suckle

their young at the breast, but some of them have pubic warts resembling mammæ. The muscles of the chest are developed in proportion, and the sternum has a medial ridge something like that of a bird. They are all nocturnal, with small eyes (except in the case of the frugivorous bats), large ears, and in some cases membranous appendages to the nostrils, which may possibly be for the purpose of guiding themselves in the dark, for it is proved by experiment that bats are not dependent on eyesight for guidance, and one naturalist has remarked that, in a certain species of bat which has no facial membrane, this delicacy of perception was absent. I have noticed this in one species, *Cynopterus marginatus*, one of which flew into my room not long ago, and which repeatedly dashed itself against a glass door in its efforts to escape. I had all the other doors closed.

Sternum of *Pteropus*.

Bats are mostly insectivorous; a few are fruit-eaters, such as our common flying-fox. They produce from one to two at a birth, which are carried about by the mother and suckled at the breast, this peculiarity being one of the anatomical details alluded to as claiming for the bats so high a place.

Bats are divided into four sub-families—*Pteropodidæ*, *Vampyridæ*, *Noctilionidæ*, and *Vespertilionidæ*.

MEGACHIROPTERA.

SUB-FAMILY PTEROPODIDÆ.

GENUS PTEROPUS.

These are frugivorous bats of large size, differing, as remarked by Jerdon, so much in their dentition from the insectivorous species that they seem to lead through the flying Lemurs (*Colugos*) directly to the *Quadrumana*. The dentition is more adapted to their diet; they have cutting incisors to each jaw, and grinders with flat crowns, and their intestines are longer than those of the insectivorous bats. They produce but one at birth, and the young ones leave their parents as soon as they can provide for themselves. The tongue is covered with rough papillæ. They have no tail. These bats and some of the following genus, which are also frugivorous, are distinguished from the rest of the bats by a claw on the first or index finger, which is short.

Dental formula: Inc., $\frac{4}{4}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3}$.

No. 31. PTEROPUS EDWARDSII *vel* MEDIUS.

The Common Flying Fox (Jerdon's No. 12).

The Flying Fox at Home.

NATIVE NAMES.—*Badul*, Bengali and Mahratti; *Wurbagul*, Hindi; *Toggul bawali*, Canarese; *Sikurayi*, Telegu.

HABITAT.—All through India, Ceylon, and Burmah.

DESCRIPTION.—Head and nape rufous black; neck and shoulders golden yellow (the hair longer); back dark brown; chin dark; rest of body beneath fulvous or rusty brown; interfemoral membrane brownish black.—*Jerdon.*

SIZE.—Length, 12 to 14 inches; extent of wings, 46 to 52 inches.

These bats roost on trees in vast numbers. I have generally found them to prefer tamarinds of large size. Some idea of the extent of these colonies may be gathered from observations by McMaster, who attempted to calculate the number in a colony. He says: "In five minutes a friend and I counted upwards of six hundred as they passed over head, *en route* to their feeding grounds; supposing their nightly exodus to continue for twenty minutes, this would give upwards of two thousand in one roosting place, exclusive of those who took a different direction."

Head of *Pteropus medius.*

Tickell's account of these colonies is most graphic, though Emerson Tennent has also given a most interesting and correct account of their habits. The former writes:—"From the arrival of the first comer until the sun is high above the horizon, a scene of incessant wrangling and contention is enacted among them, as each endeavours to secure a higher and better place, or to eject a neighbour from too close vicinage. In these struggles the bats hook themselves along the branches, scrambling about hand over hand with some speed, biting each other severely, striking out with the long claw of the thumb, shrieking and cackling without intermission. Each new arrival is compelled to fly several times round the tree, being threatened from all points, and, when he eventually hooks on, he has to go through a series of combats, and be probably ejected two or three times before he makes good his tenure."

for faithful portraying, no one could improve on this description. These bats are exceeding strong on the wing. I was aware that they went long distances in search of food, but I was not aware of the power they had for sustained flight till the year 1869, when, on my way to England on furlough, I discovered a large flying fox winging his way towards our vessel, which was at that time more than two hundred miles from land. Exhausted, it clung on to the fore-yard arm; and a present of a rupee induced a Lascar to go aloft and seize it, which he did after several attempts. The voracity with which it attacked some plantains showed that it had been for some time deprived of food, probably having been blown off shore by high winds. Hanging head-downwards from its cage, it stuffed the fruit into its cheeks, monkey-fashion, and then seemed to chew it at leisure. When I left the steamer at Suez it remained in the captain's possession, and seemed to be tame and reconciled to its imprisonment, tempered by a surfeit of plantains. In flying over water they frequently dip down to touch the surface. Jerdon was in doubt whether they did this to drink or not, but McMaster feels sure that they do this in order to drink, and that the habit is not peculiar to the *Pteropodidæ*, as he has noticed other bats doing the same. Colonel Sykes states that he "can personally testify that their flesh is delicate and without disagreeable flavour;" and another colonel of my acquaintance once regaled his friends on some flying fox cutlets, which were pronounced "not bad." Dr. Day accuses these bats of intemperate habits; drinking the toddy from the earthen pots on the cocoanut trees, and flying home intoxicated. The wild almond is a favourite fruit.

Mr. Rainey, who has been a careful observer of animals for years, states that in Bengal these bats prefer clumps of bamboos for a resting place, and feed much on the fruit of the betel-nut palm when ripe. Another naturalist, Mr. G. Vidal, writes that in Southern India the *P. medius* feeds chiefly on the green drupe or nut of the Alexandrian laurel (*Calophyllum inophyllum*), the kernels of which contain a strong-smelling green oil on which the bats fatten amazingly; and then they in turn yield, when boiled down, an oil which is recommended as an excellent stimulative application for the hair. I noticed in Seonee a curious superstition to the effect that a bone of this bat tied on to the ancle by a cord of black cowhair is a sovereign remedy, according to the natives, for rheumatism in the leg. Tickell states that these bats produce one at a time in March or April, and they continue a fixture on the mother till the end of May or beginning of June.

No. 32. PTEROPUS LESCHENAULTII (CYNONYCTERIS AMPLEXICAUDATA).

The Fulvous Fox-Bat (Jerdon's No. 13).

Dobson places this bat in the sub-group *Cynonycteris*. It seems to differ from *Pteropus* only, as far as I can see, in having a small distinct tail, though the above-quoted author considers it closely allied to the next genus.

HABITAT.—The Carnatic, Madras and Trichinopoly; stated also procurable at Calcutta and Pondicherry (*Jerdon*); Ceylon (*Kellaart*).

DESCRIPTION.—Fur short and downy; fulvous ashy, or dull light ashy brown colour, denser and paler beneath; the hairs whitish at the base; membranes dark brown.

SIZE.—Length, 5 to 5½ inches; extent of wing, 18 to 20 inches.

More information is required regarding the habits of this bat.

GENUS CYNOPTERUS.

This genus has four molars less than the last, a shorter muzzle; the cheek-bones or zygomatic arch more projecting; tongue rather longer and more tapering, and slightly extensile.

Dental formula: Inc., $\frac{4}{4}$ or $\frac{4}{2}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{2-2}{2-2}$.

No. 33. CYNOPTERUS MARGINATUS.

The Small Fox-Bat (Jerdon's No. 14).

NATIVE NAME.—*Chamgadili*, Hindi; *Coteekan voulha*, Singhalese.

HABITAT.—India generally, and Ceylon.

Cynopterus marginatus.

DESCRIPTION.—General colour fulvous olivaceous, paler beneath and with an ashy tinge; ears with a narrow margin of white (*Jerdon.*) A reddish smear on neck and shoulders of most specimens; membranes dusky brown. Females paler (*Kellaart*).

SIZE.—Length, 4½ to 5½ inches; extent of wing, 17 to 20 inches.

This bat is found all over India; it is frugivorous exclusively, though some of this sub-order are insectivorous. Blyth says he kept some for several weeks; they would take no notice of the buzz of an insect held to them, but are ravenous eaters of fruit, each devouring its own weight at a meal, voiding its food but little changed whilst slowly munching

away; of guava it swallows the juice only. Blyth's prisoners were females, and after a time they attracted a male which hovered about them for some days, roosting near them in a dark staircase; he was also caught, with one of the females who had escaped and joined him. Dr. Dobson writes that in three hours one of these bats devoured twice its own weight. This species usually roosts in trees.

No. 34. MACROGLOSSUS (PTEROPUS) MINIMUS.

The Tenasserim Fox-Bat.

NATVIE NAME.—*Lowo-assu* (dog-bat), Javanese.

HABITAT.—The Himalayas, Burmah, Tenasserim, and the Indian Archipelago.

DESCRIPTION.—Ears half length of head, narrow and rounded at tip; face abruptly narrowed in front of eyes; muzzle long, narrow, cylindrical; lower jaw slightly projecting; eyes large; tongue very long, last third attenuated, covered with brush-like papillæ; interfemoral membrane very narrow, especially at root of tail; fur reddish brown, and very long.

SIZE.—Head and body, $2\frac{3}{10}$ inches.

Like other *Pteropi* this bat feeds on fruit of every description, but particularly attacks the various cultivated varieties of *Eugenia* (Jamoon).

GENUS EONYCTERIS.

Muzzle long and cylindrical; nostrils scarcely projecting; upper lip with a shallow vertical groove in front; *index finger without a claw*; thumb short; part of the terminal phalanx included in the wing membrane; metacarpal bone of the second finger equal to the index finger in length; tail short and distinct; the base contained in the narrow interfemoral membrane; tongue long, as in *Macroglossus*.

Dentition: Inc., $\frac{4}{4}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$.

No. 35. EONYCTERIS SPELÆA.

HABITAT.—Burmah.

DESCRIPTION.—Head long; muzzle narrow, cylindrical, abruptly narrowed in front of the eyes; nostrils with an intervening emargination, which also passes down to the lips; tongue very long and pointed; ears conical, with rounded tips; body clothed with very short and thinly-spread fur of a uniform dark brown colour; the fur on the head extends only as far as the inner corners of the eye, leaving the rest of the face naked; tail half an inch. On each side, and a little behind

to anal opening, are two small, kidney-shaped subcutaneous glandular bodies.

SIZE.—Head and body, 4 inches; tail, ½ inch.

Found in Farm Caves, Moulmein. The absence of the claw on the index finger is specially to be noted.

MICROCHIROPTERA.

SUB-FAMILY VAMPYRIDÆ.

GENUS MEGADERMA.

Bats with simple or complicated nose-leaves or membranes. The conch of the ear very large, and joined together on the top of the head; tragus large and bifurcated; nasal membranes complicated; no tail; wings remarkably ample. They have four incisors below but none above, the intermaxillaries remaining cartilaginous.

Dental formula: Inc., $\frac{0}{4}$; can., $\frac{1-1}{1-1}$; pre-m., $\frac{2-2}{2-2}$ or $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3}$

No. 36. MEGADERMA LYRA.

The Large-eared Vampire Bat (Jerdon's No. 15).

Megaderma lyra.

HABITAT.—India and Ceylon.

DESCRIPTION.—Above ashy blue, slaty or pale mouse colour; albescent or yellowish ashy beneath; nasal appendage large, oblong, free at the tip, reaching to the base of the ears with a fold down the centre; tragus (*oreillon*) cordate, two-lobed, anterior long, narrow and pointed, posterior lobe half the height and rounded; muzzle truncated; under-lip cleft; wing membranes dark brown.

SIZE.—Head and body, 3 or 3½ inches; wing extent, 14 to 19 inches.

Very abundant in old buildings. They are beyond doubt blood-suckers. Blyth noticed one fly into his room one evening with a small *vespertilio*, which it dropped on being chased. The smaller bat was

weak from loss of blood, and next morning (the Megaderm having been caught), on both bats being put into the same cage, the little one was again attacked and devoured; it was seized both times behind the ear. McMaster writes that in Rangoon he had a tame canary killed by a bat, and the bird's mate soon afterwards was destroyed in the same way. The case was clearly proved.

Mr. Frith informed Mr. Blyth that these bats were in the habit of resorting to the verandah of his house at Mymensing, and that every morning the ground under them was strewed with the hind quarters of frogs, and the wings of large grasshoppers and crickets. On one occasion the remains of a small fish were observed; but frogs appeared to be their chief diet—never toads; and of a quiet evening these animals could be distinctly heard crunching the heads and smaller bones of their victims.

No. 37. MEGADERMA SPECTRUM.

The Cashmere Vampire (Jerdon's No 16).

HABITAT.—Cashmere.

DESCRIPTION.—Above slaty cinereous, whitish beneath; the vertical nose-leaf of moderate size, oval; inner lobe of tragus ovate (*Jerdon*).

SIZE.—Two and three-quarter inches.

Dobson makes this bat synonymous with the last.

No. 38. MEGADERMA SPASMA.

HABITAT.—Tenasserim, Ceylon.

DESCRIPTION. — Muzzle, ear-conch, and tragus similar to those of *M. lyra;* the posterior portion of the tragus, however, is longer and more attenuated upwards, and more acutely pointed; the nose-leaf is shorter, with convex sides; but the anterior concave disc is considerably larger, and the base of the thickened process is cordate; thumbs and wings as in *M. lyra;* interfemoral membrane deeper; the calcaneum stronger; colour the same.

SIZE.—Head and body, about 3 inches. This bat is alluded to by Jerdon as *M. Horsfieldii.*

Megaderma spasma.

RHINOLOPHINÆ.

Nasal leaf complicated, and crests resting on the forehead, presenting more or less the figure of a horse-shoe; tail long and placed in the interfemoral membrane; ears large, but separate, and not joined at the base, as in the last genus; without a tragus, but often with a lobe at the base of the outer margin; wings large and long; forefinger of a single joint.

GENUS RHINOLOPHUS.

Nose-leaf cordate, or semi-orbicular, bi-lobed in front of the nostrils; a longitudinal crest along the nose and an erect frontal leaf posteriorly more or less lanceolate.—*Jerdon.*

Dental formula: Inc., $\frac{2}{4}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$.

No. 39. RHINOLOPHUS PERNIGER *vel* LUCTUS.

The Large Leaf-Bat (Jerdon's No 17).

Rhinolophus luctus.

HABITAT.—Nepaul, Darjeeling, Khasya Hills.

DESCRIPTION.—Ears very large, much longer than the head; broad, acutely pointed; nasal apparatus very complicated; the lower leaf very large, concealing the upper lip like a door knocker; the upper leaf like a graduated spire; ears transversely striate; a rather large semi-circular lobe at base of ear; fur long, dense, soft, and lax, slightly curled or woolly black with a silvery grizzle, or greyish-black or rich chestnut-brown.—*Jerdon.*

SIZE.—Length, $3\frac{3}{4}$; tail, $1\frac{3}{4}$; wing expanse, 17 inches.

No. 40. RHINOLOPHUS MITRATUS.

The Mitred Leaf-Bat (Jerdon's No. 18).

HABITAT.—Chybassa, Central India, Mussoorie (?)

DESCRIPTION.—Ears large; anti-helix moderately developed; upper

less triangular acute; tail extending beyond the tibia; color above light brown; paler beneath.—*Jerdon.*

SIZE.—Head and body, 2½ inches; tail, 1½ inch; wing expanse, 12 to 14 inches.

No. 41. RHINOLOPHUS TRAGATUS *vel* FERRUM-EQUINUM.

The Dark-brown Leaf-Bat (*Jerdon's No.* 19).

HABITAT.—Nepaul, Mussoorie.

DESCRIPTION.—Upper process like a barbed spear-head; central one

Rhinolophus ferrum-equinum.

small and narrow, a little expanded at the summit; anti-tragus less developed than usual; lips simple; colour a uniform deep brown, with tips of the hair paler, and somewhat rusty.—*Jerdon.*

SIZE.—Head and body, 2⅝ inches; tail, 1⅞ inch; wing, 15½ inches.

The tail of this species seems unusually long. It is found in cavities of rock, and issues forth soon after dusk—sooner, according to Hodgson, than the species of *vespertilio.*

No. 42. RHINOLOPHUS PEARSONII.

Pearson's Leaf-Bat (Jerdon's No. 20).

HABITAT.—Lower Himalayan range, Darjeeling, Mussoorie, &c.

DESCRIPTION.—Colour above dark brown, with a slight shade of chestnut; underneath brown, with a sooty cast; fur very long, dense and soft; ears distinct, with an additional rounded lobe below, measuring anteriorly nearly three-fourths of an inch; point of the facial crest moderately developed; length from the tip of the nose to root of tail three inches; tail half an inch; length of fore-arm two inches; expanse of the wings eleven inches. Although allied to Mr. Hodgson's *R. tragatus*, possesses distinct characters.—*Horsfield.*

SIZE.—As given by Horsfield above.

This bat was first sent from Darjeeling by Mr. J. T. Pearson, and was named after him. It has also, according to Jerdon, been found by Captain Hutton at Mussoorie; it is therefore reasonable to suppose that it inhabits the whole range of the lower Himalayas. One striking difference between it and the last species is the very short tail, and it is easily to be recognised by the great length of the fur.

No. 43. RHINOLOPHUS AFFINIS.

The Allied Leaf-Bat (Jerdon's No 21).

HABITAT.—Ceylon, Burmah, and perhaps the Malabar coast.

DESCRIPTION.—Above bright red ferruginous brown; tips of hair darker, paler beneath; ears pointed and external; edge deeply emarginated; internal edge and basal third of external surface hairy; anti-helix well developed; nasal process apparently very similar to that of *R. mitratus* (*Kellaart*). Upper leaf triangular, emarginate at the tip, reaching above the base of the ears (*Jerdon*).

SIZE.—Head and body about $2\frac{3}{10}$ inches; tail, 1 inch; wing extent, 12 inches.

This bat seems to vary much in colour. Kellaart says some are of a brighter red than others, and a few had a yellower tinge. Another marked variety was of a uniform pale yellow brown.

No. 44. RHINOLOPHUS ROUXI.

The Rufous Leaf-Bat (Jerdon's No. 22).

HABITAT.—India generally.

DESCRIPTION.—Ears large, pointed, externally notched; tragus broad; tips of upper nose-leaf triangular, with its sides well emarginate, reaching above the base of the ears; no upper incisors [as in *Megaderma lyra*];

lower molars only five; canines very large; fur short, crisp; colour above smoky brown in some, reddish brown in others, and golden rufous in some; beneath paler.—*Jerdon.*

SIZE.—Length, $2\frac{3}{8}$ inches; tail, $1\frac{1}{8}$; wing expanse, 13 inches.

Hodgson considers this bat as allied to the two following species. It is the *R. lepidus* of Blyth.

No. 45. RHINOLOPHUS MACROTIS.

The Large-eared Leaf-Bat (Jerdon's No. 23).

HABITAT.—Lower Himalayas.

DESCRIPTION.—Ears very large, broad, oval, with pointed recurved tip, and a large obtuse tragus; anterior central crest of nose-leaf produced in front over the top of the flat transverse front edge; hinder leaf lanceolate triangular; above sooty brown or light earthy olive-brown, paler below, some with a rufous or Isabelline tint; no pubic e ats.—*Jerdon.*

SIZE.—Head and body, $1\frac{3}{4}$ inch; tail, $\frac{3}{4}$; wing expanse, $9\frac{3}{4}$.

No. 46. RHINOLOPHUS SUB-BADIUS.

The Bay Leaf-Bat (Jerdon's No. 24).

HABITAT.—Nepaul.

DESCRIPTION.—Ears not larger than the head, obtusely pointed and ovoid; nasal appendage quadrate, with a transverse bar nearly surmounting it; upper leaf triangular, with slightly emarginate sides; clear brown above, paler below and on head and face.

SIZE.—Head and body, $1\frac{1}{2}$ inch; tail, $1\frac{1}{4}$; wing expanse, $7\frac{1}{2}$.—*Jerdon.*

No. 47. RHINOLOPHUS RAMMANIKA (*Kellaart*).

HABITAT.—Ceylon.

DESCRIPTION.—Above rufescent, beneath ashy brown; face slightly fulvous; round the base of the ears and on the sides of the posterior half of the body bright fulvous; tail enclosed in the interfemoral membrane.

SIZE.—Head and body, $2\frac{1}{2}$ inches; tail, 1; wing expanse, 10 inches.

This is a doubtful species. Dr. Kellaart got one from Amanapoora hill at Kaduganava. He says: "As the specimen reached us in a dried condition, we are unable to say anything more about its nasal processes than that in place of a transverse process above the nostrils it had a small triangular peak over the usual horse-shoe process surrounding the nasal opening. This triangular crest was hairy; superiorly there was no appearance of a sac above it to the best of our recollection.

No. 48. RHINOLOPHUS ANDAMANENSIS.

HABITAT.—Southern Andaman Island.

DESCRIPTION (*apud* Dobson).—Like *R. affinis* generally, but the anterior horizontal horse-shoe shaped membrane is very broad, completely concealing the muzzle when viewed from above, as in *R. Pearsonii;* the posterior terminal leaf is also much longer, produced backwards between the ears, and not concave on the sides as in *R. affinis.* The thumb is also much longer. Fur bright reddish brown above and beneath.

No. 49. RHINOLOPHUS MINOR.

HABITAT.—Burmah, Yunan.

DESCRIPTION.—Light brown above, greyish brown beneath; ears slightly shorter than the head, sub-acutely pointed; anti-tragus large, separated by a deep angular notch; lower lip with three vertical grooves.

SIZE.—Length of head and body from 1 to $1\frac{3}{4}$ inch.

No. 50. RHINOLOPHUS CŒLOPHYLLUS.

HABITAT.—Burmah.

DESCRIPTION.—Fur brown, with whitish roots, light brownish white below; ears large, with pointed tips projecting outwards; "anti-tragus large, separated by an angular emargination from the outer margin of the ear; horse-shoe large; horizontal margins of central nose-leaf triangular, small; erect portion rather short, with parallel sides and rounded summit, meeting the connected vertical process at the same level" (*Dobson*). For a more detailed description see Dobson's Monograph, page 53. Three vertical grooves on lower lip.

SIZE.—Length of head and body about 2 inches.

No. 51. RHINOLOPHUS GAROENSIS.

HABITAT.—Garo Hills, Assam; Himalayas (Mussoorie).

DESCRIPTION (*apud* Dobson).—Ears acutely pointed, with a large anti-tragus, as in *R. affinis;* anterior vertical process of the sella maintaining the same breadth upwards and rounded off above, considerably exceeded in height by the upper edge of the connecting process, which develops a long acutely pointed projection; terminal portion of the posterior leaf broad with straight sides, forming an almost equilateral triangle.

Wing membrane from the ankles, inter femoral membrane square behind; extreme tip of the tail free.

SIZE.—Length of head and body about 1·5 inch.

This bat is figured (head only) in Dobson's Monograph, page 48.

No. 52. RHINOLOPHUS PETERSII.

HABITAT.—India. Precise locality unknown.

DESCRIPTION.—Ears acutely pointed, with an emargination immediately beneath the tip; anti-tragus large, separated from the outer margin by a deep angular incision; nose-leaf horizontal, horse-shoe-shaped, not so broad as the muzzle; vertical part of the sella almost same breadth upwards, and rounded off above, exceeded considerably in height by the upper margin of the posterior connecting process; lower lip with three vertical grooves; fur dark brown above, greyish brown beneath.

SIZE.—Length of head and body, 2·5 inches; tail, 1 inch.

There are two good woodcuts of the head of this bat in Dobson's Monograph.

No. 53. RHINOLOPHUS TRIFOLIATUS.

HABITAT.—East coast of India.

DESCRIPTION.—Very much like *R. perniger* (*luctus*), but is distinguished by its smaller size and by the more pointed vertical process of the central nose-leaf, which in the other is truncated.

SIZE.—Length of head and body, 2 inches; tail about 1 inch.

GENUS HIPPOSIDEROS (GRAY) VEL PHYLLORHINA (BONAPARTE).

Nasal-leaf broad, depressed, transverse; ears with transverse wrinkles; a circular sac behind the nasal crest, which can be turned inside out; when alarmed the animal blows it out, and then withdraws it at each breath; it contains a waxy matter of green or yellow colour. Blyth thinks that this sac is affected by the amorous season, as in the case of the infra-orbital cavities of various ruminants and analogous glandular follicles in other animals.

This genus is also distinguishable from the last by the form of the ear conch, the small size of the anti-tragus, and, as Dr. Dobson particularly points out, by the presence of *two* joints only in all the toes, as also by the number and character of the teeth, which are as follows:—

Inc., $\frac{2}{4}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$.

No. 54. HIPPOSIDEROS ARMIGER.

The Large Horse-shoe Bat (Jerdon's No. 25).

HABITAT.—Lower Himalaya ranges; Ceylon.

DESCRIPTION.—Nasal-leaf large and square; lips with a triple fold of skin on each side; tragus vaguely developed and wavily emarginate; of a uniform light-brown colour, with maroon tips to the hairs of the upper parts; membranes black.

SIZE.—Head and body, 4½ inches; tail, 2½; wing expanse, 22.

Jerdon makes this out to be the same as Kellaart's *H. lankadiva* and the Malayan *H. nobilis*, but those are synonymous with *Phyllorhina diadema*. Kellaart supposed it to be identical with *H. insignis*, which will be found further on as *Phyllorhina larvata*, all those bats closely resembling each other in a general way. I think this No. 25 of Jerdon is the same as Peter's *Phyllorhina armigera*. Hutton found it at Darjeeling, and writes of it as follows:—

"When captured alive the large ears are kept in a constant state of rapid tremulous motion, and the animal emits a low purring sound, which becomes a sharp scream when alarmed or irritated. When suspended at rest the tail and inter-femoral membrane are turned up, not in front, like the *Rhinolophi*, but behind, over the lower part of the back; neither does it appear to envelope itself in its wings so completely as does *R. luctus*." He then goes on to say he has noticed the tremor of the ears and facial crests in all the *Rhinolophi* when disturbed, and concludes with a graphic description of this species, sallying forth in the evening to prey upon the noisy *Cicadas;* leisurely wheeling with noiseless, cautious flight round some wide-spreading oak, "scanning each branch as he slowly passes by—now rising to a higher circle, and then perchance descending to the lower branches, until at length, detecting the unfortunate minstrel, it darts suddenly into the tree, and snatching the still screaming insect from its perch, bears it away."

Jerdon procured specimens at Darjeeling, and Kellaart says it is found in great abundance at Kandy and its neighbourhood; Kurnegalle Tunnel swarms with them.

No. 55. HIPPOSIDEROS SPEORIS.

The Indian Horse-shoe Bat (Jerdon's No. 26).

HABITAT.—India generally and Ceylon.

DESCRIPTION.—Mouse brown or fulvous brown. Occasionally golden fulvous and sometimes dusky black above, paler beneath; membranes dusky brown; interfemoral membrane narrow, enclosing the tail except the last half joint (about 2-10ths of an inch), which is free.

Ear large, erect and pointed, rounded at the base and emarginated on the outer edge; nasal process complicated. "Males have a frontal sac; females none" (*Kellaart*). Pubis naked, with two inguinal warts.

SIZE.—Head and body, 2 inches; tail, $1\frac{2}{10}$; wing expanse, 12.

Inhabits old buildings, wells, &c.

No. 56. HIPPOSIDEROS MURINUS.

The Little Horse-shoe Bat (*Jerdon's No.* 27).

HABITAT.—Southern India, Ceylon, and Burmah.

DESCRIPTION.—Muzzle short; body short and thick; a transverse frontal leaf with a sac behind it; no folds of skin on each side of the horse-shoe as in the last species; ears large, naked and rounded; colour dusky brown or mouse, sometimes light fawn; wing membrane blackish; interfemoral membrane large, and including the tail all but the tip.

SIZE.—Head and body, $1\frac{4}{5}$ inch; tail, $1\frac{1}{5}$ inch; wing expanse, 10.

Jerdon says the mouse-coloured variety is common in the Carnatic, but he has only seen the light fulvous race on the Nilgheries; but Mr. Elliot procured both in the southern Mahratta country. A dark variety of this bat was called *Rhinolophus ater* by Templeton, and *H. atratus* by Kellaart; in other respects it is identical, only a little smaller.

No. 57. HIPPOSIDEROS CINERACEUS.

The Ashy Horse-shoe Bat (*Jerdon's No.* 28).

HABITAT.—Punjab Salt range.

DESCRIPTION.—Similar to the last, but larger, and I should think the argument against *H. atratus* would apply to this as a distinct species.

No. 58. HIPPOSIDEROS LARVATUS. *Syn.*—PHYLLORHINA LARVATA.

HABITAT.—Arracan.

DESCRIPTION.—The fur of the upper part bright fulvous; more or less tinged with maroon on the back, lighter underneath; membranes dusky, but tinged with the prevailing colour of the fur; ears angulated; a minute false molar in front of the carnassial in the upper jaw.

SIZE.—Head and body, $2\frac{3}{4}$ inches; tail, $1\frac{1}{4}$; wing extent, 12.

Kellaart writes of this bat under his *H. aureus*. He describes it as head, neck, and body of a bright golden yellow, with a slight maroon shade on the tips of the hairs on the back. Females paler coloured. Frontal sac only in males; the waxy matter of a yellow colour, and quite transparent.

No. 59. HIPPOSIDEROS VULGARIS. *Syn.*—PHYLLORHINA LARVATA.

The Common Malayan Horse-shoe Bat.

HABITAT.—Arracan and Malayana.

DESCRIPTION.—"It differs from the last in being rather smaller, and of a brown colour above, much paler at the base of the hairs and at their extreme tips, and lighter coloured below; the ears more apiculated, or rather they appear so from being strongly emarginated externally towards the tip."—*Blyth.*

SIZE.—$2\frac{3}{10}$ inches; tail $1\frac{2}{10}$; wing expanse about 12.

No. 60. HIPPOSIDEROS BLYTHII.

HABITAT.—Ceylon, Fort Frederic.

DESCRIPTION.—Above surface colour a rich dark tawny brown; base of hairs much lighter coloured, of a brighter yellow tinge; beneath paler; face partially blackish; ears black; tip of tail excerted; no frontal sac; membranes blackish; nasal processes as in *H. speoris.*

SIZE.—Head and body, $2\frac{2}{10}$ inches; tail, 1; wing expanse, 12.

Dr. Kellaart considered this a new and undescribed species, distinguished from *H. speoris* and *H. vulgaris* (*vel Templetonii*—Kellaart) by the greater length of the fore-arm, which is two inches. This remark however does not apply to *vulgaris*, of which Kellaart himself gives two inches as the length of the radius, and Blyth gives two and a quarter. The absence of the frontal sac would have been a greater proof, but both specimens on which Kellaart made his observations were females; and as colouring is so varied in the bat tribe as to preclude the division of species on this ground, I think we may put this down as a doubtful species on which more information is desirable.

No. 61. PHYLLORHINA DIADEMA.

HABITAT.—India generally; Ceylon and Burmah.

DESCRIPTION.—The fur with three shades—buff, then reddish brown with ashy tips, underneath greyish or pale brown. "The hinder erect nose-leaf," according to Dobson's description, "equals the horse-shoe and slightly exceeds the sella in width, its free margin forming a segment of the circumference of a circle, with a small blunt projection in the centre and three vertical ridges on its concave front surface; sella large, with a prominent ridge in the centre, forming a small projection above and one smaller on each side; sides of the muzzle with prominent vertical leaves, three on each side; no frontal pore."

There is a good figure of the head of this bat in Cuvier's 'Animal Kingdom,' Carpenter's and Westwood's edition, under the name of

Rhinolophus nobilis. It is the same also as Kellaart's *Hipposideros kandiva*. Captain Hutton, who was a keen observer of the habits of the bats at Mussoorie, says of this one: "Like *R. affinis*, this species may frequently be heard during its flight cracking and crunching the hard wings of beetles, which in the evening hours are usually abundant among the trees; the teeth are strong, and the *tout ensemble* of its aspect is not unlike that of a bull-dog."—'Proc. Zoo. Soc.,' 1872, page 701.

No. 62. PHYLLORHINA MASONI.

HABITAT.—Burmah (Moulmein).

DESCRIPTION.—This bat resembles the last closely; such difference as exists is that the concave surface of the terminal nose-leaf is divided into two cells only by a single central vertical ridge, and from the under surface of the juncture of the mandible a small bony process projects downwards about equal to the lower canine tooth in vertical extent, and covered by the integument.

There is an excellent figure of this bat in Dobson's Monograph, from whence I have also taken the above description.

No. 63. PHYLLORHINA NICOBARENSIS.

HABITAT.—Nicobar Island.

DESCRIPTION.—"Ears large, acute; outer margin slightly concave beneath the tip; no frontal sac behind the nose-leaf; upper margin of the transverse terminal leaf simple, forming an arc of a circle, folded back and overhanging the concave front surface, which is divided into *two* cells only by a single central longitudinal ridge; in front the margin of the horse-shoe is marked by three small points" (*Dobson*). Fur light brown, then greyish, with light brown tips.

SIZE.—Length of head and body, 3 inches.

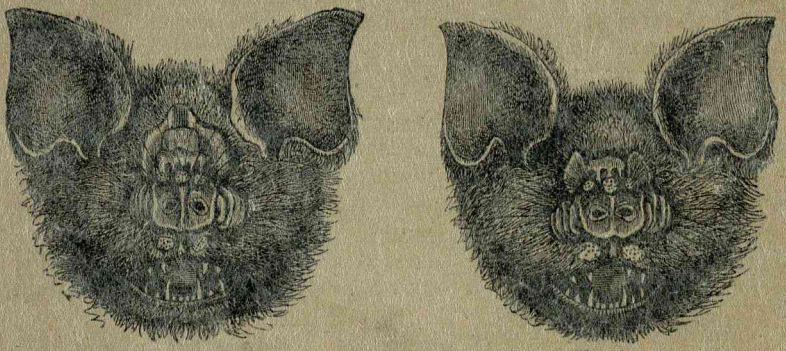
No. 64. PHYLLHORINA ARMIGERA.

HABITAT.—The entire range of the Himalayas, Khasya Hills, and Ceylon.

DESCRIPTION.—The hinder erect nose-leaf narrow, not so broad as the horse-shoe; upper edge sinuate, slightly elevated in the centre, and at either extremity; vertical ridges beneath well developed, prominent, enclosing moderately deep cells; wart-like granular elevations on each side above the eyes are usually greatly developed, forming large thickened longitudinal elevations extending forward on each side of the posterior erect nose-leaf, and backwards towards the frontal sac (*Dobson*). The colour varies.

SIZE.—Length of head and body from 3 to 4 inches; tail about 2.

This is the largest of this genus, and one of the most interesting of the species. My space will not admit of extensive quotations from those who have written about it, but there is a fuller description of it in



Male. Female.

Phyllorhina armigera.

Dr. Dobson's book, and a very interesting account of its habits by Capt. J. Hutton, in the 'Proceedings of the Zoological Society,' 1872, page 701.

No. 65. PHYLLORHINA LEPTOPHYLLA.

HABITAT.—Khasya Hills.

DESCRIPTION.—Ears large, broad, triangular, with subacute tips; outer margin slightly concave; upper transverse nose-leaf small; upper edge simple, narrower than horse-shoe, thin; three vertical folds in front faintly descernible at base only; horse-shoe with small incision in centre of front free edge; frontal pore small, placed at some distance behind the transverse nose-leaf; fur and integuments dark throughout. —*Dobson.*

SIZE.—Length of head and body, 2 inches; tail, $1\frac{6}{10}$.

No. 66. PHYLLORHINA GALERITA.

HABITAT.—Central India, Deccan.

DESCRIPTION.—"Ear comparatively small, as broad as long; inner margin very convex forward; outer margin slightly concave beneath the tip; nose-leaf as in *P. larvata*, but the transverse terminal leaf is more rectangular; the superior margin less convex, and its concave front surface is marked by three very prominent vertical ridges; frontal pore small, indistinct, not larger than in the females of *P. larvata*."—*Dobson.*

SIZE.—Head and body about 2 inches; tail, 1 inch.

No. 67. PHYLLORHINA BICOLOR.

HABITAT.—India (N. W. Himalaya), Nicobar Islands.

DESCRIPTION.—Fur above reddish chestnut; the base of the hairs pale reddish-white, or base of hair pure white, the tip, dark reddish-brown. Ears as long as the head, broad; the lower half of the inner margin very convex; the summit of the ear conch rounded off broadly as far as a point on the outer side, where a slight but distinct flattening occurs, and indicates the position of the tip. Horse-shoe small, square; the concave front surface divided into four cells by three distinct vertical ridges; no secondary leaflets external to the horse-shoe; frontal sac distinct in males, rudimentary in females (*Dobson*). Blyth includes this bat in his Burmese Catalogue, but does not say much about it.

GENUS CŒLOPS.

Possesses the general characteristics of *Rhinolophus*, but the tail and calcanea wanting entirely; the intercrural membrane acutely emarginate to the depth of a line even with the knees; ears large, broad and rounded; the summit of the facial membranes rising abruptly, obtusely bifid, bent forward; fur long, delicately fine.—*Jerdon.*

Dental formula: Inc., $\frac{1-1}{4}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$.

No. 68. CŒLOPS FRITHII.

Frith's Tailless Bat (*Jerdon's No.* 29).

HABITAT.—The Sunderbunds, Bengal.

DESCRIPTION.—Colour dusky or blackish; the fur tipped with ashy brown above, paler and somewhat ashy beneath; membranes fuscous.

SIZE.—Length, $1\frac{7}{8}$ inch; membrane beyond $\frac{3}{4}$ inch; forearm, $1\frac{1}{4}$.

This bat is rare. The above description, given by Jerdon, is based on one specimen sent to Mr. Blyth by Mr. Frith, who obtained it in the Sunderbunds. It also inhabits Java. Dr. Dobson examined a specimen from thence in the Leyden Museum. He says: "Calcanea and tail very short," whereas the above description says entirely wanting. The ears are funnel-shaped, and thickly covered with fine hair. Metacarpal bone of thumb very long; the wing membrane enclosing the thumb up to the base of the claw; wing to the tarsus close to the ankles; feet very slender; toes with strong claws."

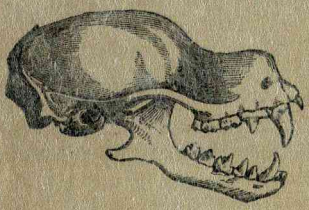
GENUS RHINOPOMA.

Ears moderate, but joined above, as in the Megaderms; the nostrils at the end of the muzzle, with a little lamina above, forming a kind of snout; tail slender and joined at the base with the intercrural membrane, but extending far beyond it.

Dental formula: Inc., $\frac{2}{4}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3}$.

No. 69. RHINOPOMA HARDWICKII.

Hardwick's Long-tailed Leaf Bat (*Jerdon's No.* 30).



Skull of *Rhinopoma*.

HABITAT.—All over India, Burmah and Malayana.

DESCRIPTION.—Muzzle long, thick, truncated, and surrounded by a small leaf; tragus oblong, bi-acuminate; forehead concave with a channel down the centre; fur soft and very fine, dull brown throughout; face, rump, and part of abdominal region naked.—*Jerdon.*

SIZE.—Head and body, $2\frac{6}{10}$ inches; tail, $2\frac{1}{2}$; expanse, 13.

Frequents old ruins, caves, and clefts in rocks.

SUB-FAMILY NOCTILIONIDÆ.

Bats without facial membranes; with short obtuse and bull-doggish heads; large lips.

GENUS TAPHOZOUS.

Have a small rounded indenture on the forehead; no raised lamina on the nostrils; the head pyramidal; eyes rather large; ears moderate in size and not joined at the base, but widely apart; the tip of the tail free above the membrane, which is much longer.

The males have a transverse cavity under the throat; wings long and narrow, collapsing with a double flexure outwards; fur soft and velvety. (Dobson includes this genus in his Family *Emballonuridæ.*)

Dental formula: Inc., $\frac{1-1}{4}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$; premaxillaries cartilaginous, supporting only one pair of weak incisors with a gap between them.

No. 70. TAPHOZOUS LONGIMANUS.

The Long-armed Bat (Jerdon's No. 31).

HABITAT.—India generally.

DESCRIPTION.—"Ears oval, with many distinct folds, naked except at the base; tragus securiform; fur thick, close, fuscous-black, or dark fuscous-brown above; beneath paler, except on the throat, the hairs being conspicuously tipped with grey, the upper hairs being all white at their base; face nude, and the membrane dark brownish-black" (*Jerdon*). The gular sac, though represented in the male, is almost absent in the female, being but a rudimentary fold of skin; in this it differs from another common Indian species, *T. saccolaimus*, in which the gular sac is well developed in both sexes, though larger in the male.

SIZE.—Length, 5 inches; expanse, 15 to 16; tail, 1; fore-arm, $2\frac{5}{8}$; tibia, 1 inch.

This bat frequents old buildings, dark cellars, old ruins, &c.; the young are fulvescent, and become darker with age. Blyth states that it has a surprising faculty for creeping about on the vertical board of a cage, hitching its claws into the minute pores of the wood.

No. 71. TAPHOZOUS MELANOPOGON.

The Black-bearded Bat (Jerdon's No. 32).

HABITAT.—Common about Calcutta, East Coast of India, Burmah, and Cochin China.

DESCRIPTION.—"No gular sac, the openings of small pores appearing along a line corresponding to the position of the mouth of the gular sac in other species; in some male specimens the hair behind these pores is very long, forming a dense black beard" (*Dobson*). Ears moderate, oval, with the outer margin extending under the eyes, dilated into a large rounded lobe; the tragus leaf-shaped; the head, muzzle, and chin covered with short hairs.

SIZE.—Length of head and body about $3\frac{1}{2}$; tail, $\frac{2}{3}$; wing expanse, 14 inches.

Horsfield says it occurs in caves in Java inhabited by the esculent swallows (*Collocalia nidifica*), the gelatinous nests of which are used for soup by the Chinese. Dobson remarks that the black beard is not always developed in the males; he conceives it to be owing to certain conditions, probably connected with the amorous seasons. In five males in the Indian Museum the beard is well developed; he found that only two per cent. of the Cochin China specimens in the Paris Museum possessed it.

No. 72. TAPHOZOUS SACCOLAIMUS.

The White-bellied Bat (Jerdon's No. 33).

HABITAT.—Peninsula of India, Burmah, and Ceylon.

DESCRIPTION.—"Muzzle angular, naked, very acute; nostrils small, close; ears distant, shorter than the head, large inner margin recurved, outer margin dilated, reaching to the commissure of the mouth; tragus wide, securiform (i.e. axe-shaped); fur short, smooth, blackish on the head, chestnut brown on the back; beneath, dirty-white or black brown above with white pencillings; pure white below" (*Jerdon*). Dobson says of the fur: "above, white at the base, the terminal three-fourths of the hairs black, with a few irregular small white patches on the back; beneath dark brown." The gular sac is to be found in both sexes, but somewhat larger in the males.

SIZE.—About 5 inches; wing expanse, 17.

No. 73. TAPHOZOUS THEOBALDI.

HABITAT.—Tenasserim.

DESCRIPTION.—The gular sac is absent in both sexes; ears larger than in any others of the sub-genus; the muzzle, from the corners of the eyes downwards, naked.

SIZE.—Head and body about $3\frac{1}{10}$ inches; tail, $1\frac{1}{4}$.

No. 74. TAPHOZOUS KACHHENSIS.

HABITAT.—Kachh, N. W. India.

DESCRIPTION (*apud* Dobson).—"Gular sac absent in both male and female; its usual position indicated in the male by a semi-circular fold of skin and nakedness of the integument in this situation; in other respects similar to *T. nudiventris*. The deposits of fat about the tail very large."

SIZE.—Head and body about 3 inches; tail, $1\frac{1}{4}$.

T. nudiventris, above alluded to, is an inhabitant of Asia Minor, Egypt, and Nubia; similar to the above, only that it has a small gular sac in the male, of which a trace only exists in the female. Its most striking peculiarity is the deposit of fat at the root of the tail, which may possibly be for purposes of absorption during the dormant winter season.

GENUS NYCTINOMUS.

"Ears broad, short, approximate or connate with the outer margin, terminating in an erect lobe beyond the conch; tragus small, concealed" (often very small and quadrate, but never reduced to a mere point, as in *Molossus*—Dobson); "wings narrow, folded as in *Taphozous*; intercrural membrane short, truncate; tail free at the tip; feet short, with strong toes; muzzle thick; lips tumid, lax; upper lip with coarse wrinkles."—*Jerdon.*

Dental formula: Inc., $\frac{2}{6}$ or $\frac{2}{4}$; can., $\frac{1-1}{1-1}$; pre-mol., $\frac{2-2}{2-2}$; mol., $\frac{3-3}{3-3}$.

No. 75. NYCTINOMUS PLICATUS.

The Wrinkle-lipped Bat (*Jerdon's No.* 34).

HABITAT.—India generally.

DESCRIPTION.—Muzzle broad and thick; upper lip overhanging the lower, marked by vertical wrinkles; ears large and quadrilateral; outer margin ending in a decided anti-tragus; tail thick; the lower part of the leg is free from the wing membrane, which however, is connected with the ankle by a strong fibrous band; fur dense, smoky or snuff brown above (or bluish black—*Dobson*); paler beneath.

SIZE.—Head and body about $2\frac{1}{10}$ inches; tail, $1\frac{1}{10}$. Jerdon gives length, $4\frac{1}{4}$ to $4\frac{1}{10}$; expanse, $13\frac{1}{2}$; tail, $1\frac{3}{4}$.

This bat is common about Calcutta, frequenting ruins, dark places and hollow trees. It is allied to *N. tenuis* (*Horsfield*), and it is mentioned as inhabiting hollow trees in such numbers as to attract attention by the hissing noise from within, every available spot in the interior being occupied. A synonym of the genus is *Dysopes.*

No. 76. NYCTINOMUS TRAGATUS.

HABITAT.—India generally.

DESCRIPTION.—This differs from the last in having the wing membrane from the ankles, and in the free portion of the tail being shorter; ears united at the base; tragus broad and rounded above, partially concealed by the large anti-tragus.

SIZE.—About the same as the last.

SUB-FAMILY VESPERTILIONIDÆ.

These bats have simple nostrils, as in the frugivorous ones, with no complications of foliated cutaneous appendages; the muzzle is conical, moderately long, and clad with fur; the ears wide apart; the inner margins springing from the sides, not the top of the head; the tragi are large; eyes usually very small, and the tail, which is long, is wholly included in the membrane.

Dentition (usually): Inc., $\frac{2-2}{6}$; can., $\frac{1-1}{1-1}$; pre-mol., $\frac{3-3}{3-3}$; mol., $\frac{3-3}{3-3}$.

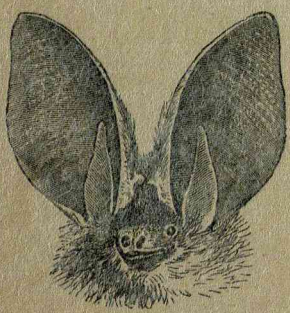
The upper incisors are small, and placed in pairs near the canines, leaving a gap in the centre. The lower ones sharp-edged and somewhat notched. At birth there are twenty-two teeth, which are shed, and replaced by others, with sixteen additional ones, the adult bat having thirty-eight teeth.

GENUS PLECOTUS.

Ears very large, united at the base; outer margin of the ear conch terminating opposite the base of the tragus, the inner margin with an abrupt rounded projection directed inwards above the base; tragus very large, tapering upwards, with a lobe at the base of the outer margin.

Dentition: Inc., $\frac{2-2}{6}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$.

The English species *P. auritus* is very common there, and also in France; its ears are nearly as long as its body, yet, when reposing, they are so folded as to be almost out of sight. The Indian species is only a variety distinguishable by its yet longer ears ("and comparative shortness of the thumbs"—*Dobson*).



Plecotus auritus.

No. 77.

PLECOTUS AURITUS *vel* HOMOCHROUS.

HABITAT. — The Himalayas and the Khasia Hills.

DESCRIPTION. — Head slightly raised above the face-line; ears nearly as long as the fore-arm, joined by a low band across the forehead at the bases of their inner margins; wings from the base of the toes; feet slender; tip of the tail free; fur silky, short, and of a uniform dull brown.

SIZE.—Head and body, 1·7 inch; ears, 1·55 (ears of English type of same size, 1·4 inch); tail, 1·7 inch. Jerdon gives larger results, but I put more reliance on Dobson's figures.

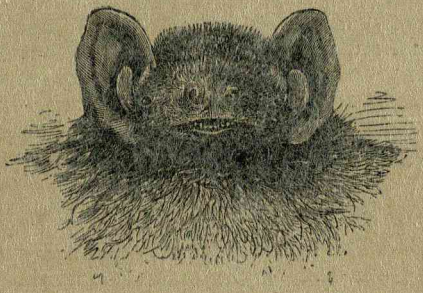
GENUS VESPERUGO.

Bats with very broad and obtuse muzzles; the glandular prominences much developed between the eyes and the nostrils; crown of the head flat; but what distinguishes it from the following genus, *Scotophilus*, is the presence of four incisors in the upper jaw, whereas *Scotophilus* has two only—otherwise the two genera are very similar.

No. 78. VESPERUGO NOCTULA.

HABITAT.—Nepal.

DESCRIPTION.—Head broad and flat; ears oval and broad; the



Vesperugo noctula.

outer margin convex, reflected backwards, and forming a thick lobe terminating close to the angle of the mouth; tragus short and curved inwards; muzzle devoid of hair; fur dark reddish brown.

No. 79. VESPERUGO LEUCOTIS.

HABITAT.—Deserts of Northern India, and Beluchistan.

DESCRIPTION.—"Ears, sides of face, about the eyes, interfemoral membrane, antehumeral membrane, and that portion of the wing membrane along the sides of the body, white, very translucent; remaining portion of wing membrane sepia, traversed by very distinct reticulations; fur on the upper surface black at the base of the hairs for about half their length, remaining portion light yellowish brown; beneath the same, but paler, almost white."—*Dobson.*

No. 80. VESPERUGO MAURUS.

HABITAT.—Khasya Hills.

DESCRIPTION.—Muzzle broad and flat, with large labial development; ears broad, triangular, broadly rounded off above; tragus broad and square; fur long and dense, uniformly sooty brown, with greyish tips; membranes, nose, ears and lips black.

SIZE.—Head and body $1\frac{1}{10}$ inch; tail, 1 inch.

No. 81. VESPERUGO AFFINIS.

HABITAT.—Burmah (Bhamo, Yunan).

DESCRIPTION (*apud* Dobson).—Head flat; upper labial glands so developed as to cause a deep depression between them on the face behind the nostrils; ears broad as long from behind; the outer margin extends from the tip to its termination near the corner of the mouth without emargination or lobe; tragus broad; inner margin straight; outer convex; small triangular lobe at base. Fur chocolate brown above, lighter on head and neck; beneath dark brown with lighter tips on the pubes, and along the thighs dirty white or pale buff.

SIZE.—Head and body, 1·9 inch; tail, 1·65 inch.

There is a good figure of the head of this bat in Dobson's Monograph; it was obtained by Dr. J. Anderson at an elevation of 4500 feet at Bhamo.

No. 82. VESPERUGO PACHYOTIS.

DESCRIPTION.—"This species is readily distinguished by the peculiar thickness of the lower half of the outer side of the ear-conch, which appears as it were excavated out of the thick integument of the neck; tragus short, curved inwards."—*Dobson.*

This bat is more fully described with three illustrations in Dobson's Monograph; he does not mention where it is found, so it may or it may not be an Indian species.

No. 83. VESPERUGO ATRATUS. *Syn.*—NYCTICEJUS ATRATUS.

HABITAT.—Darjeeling.

DESCRIPTION.—Head broad; muzzle obtuse; upper labial glands largely developed; ears large, oval, with rounded tips, which in the natural position of the ears appear acute, owing to the longitudinal folding of the outer side of the conch on the inner, commencing at and almost bisecting the tip (*Dobson*). Fur long, dense and black; Jerdon says rich dark brown; paler beneath.

SIZE.—Head and body, 1·9 inch; tail, 1·8 inch.

No. 84. VESPERUGO TICKELLI.

HABITAT.—Chybassa, Jashpur, and Sirguja.

DESCRIPTION.—Head broad and flat; labial glands developed; ears moderate, rounded above; outer edge straight, emarginate opposite base of tragus, terminating in a small lobe; tragus lunate; tail long; last vertebra free. The face is more clad with fur than in other species of this genus; fur of the body pale, straw brown above, pale buff beneath. For a fuller description and illustration, see Dobson's Monograph.

SIZE.—Head and body, 1·65 inch; tail, 2 inches.

No. 85. VESPERUGO PACHYPUS.

HABITAT.—Darjeeling, Tenasserim, and Andaman Islands.

DESCRIPTION.—Crown of head very flat; ears short, triangular, with broadly rounded tips, tragus short; under surface of the base of the thumb and soles of the feet with broad fleshy pads; wings rather short; fur fine and dense, above reddish brown, paler beneath.

SIZE.—Head and body, 1·75 inch; tail 1 inch.

No. 86. VESPERUGO ANNECTANS.

HABITAT.—Naga Hills and Assam.

DESCRIPTION.—Muzzle sharper; face hairy; ears pointed; tragus long; colour dark brown; illustration in Dobson's Monograph.

SIZE.—about 2 inches; tail, 1·6 inch.

Unites the appearance of a *Vespertilio* to the dentition of *Vesperugo*.

No. 87. VESPERUGO DORMERI.

HABITAT.—Southern India and Bellary Hills.

DESCRIPTION.—Head flat; ears shorter, triangular, with rounded tips; tragus with a small triangular lobe near base of outer margin; fur brown, with ashy tips above, darker brown below, with the terminal third of the hairs white. Dentition approaches the next genus, there being only one pair of unicuspidate upper incisors placed, one by each upper canine.

No. 88. (VESPERUGO) SCOTOPHILUS SEROTINUS. *Syn.*—VESPERUGO SEROTINUS.

The Silky Bat (*Jerdon's No.* 35).

HABITAT.—Europe, but extending through Asia to the Himalayas, Beluchistan and Kashmir.

DESCRIPTION.—Ears shorter than head, widely separate, ovate,

angular, projecting forward, terminating in a convex; lobe ending on a level with the corner of the mouth; tragus twice the length of its breadth, semi-cordate; fur deep bay or chestnut brown; above fulvous, grey beneath; hairs of back long and silky, but the colour of the fur varies considerably.

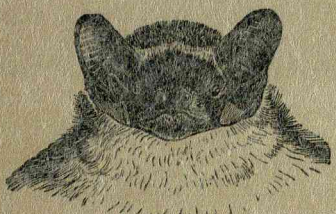
SIZE.—Head and body, 2½ inches; tail, 2; wing expanse, 13.

This is a rare bat in India, though Captain Hutton has procured it at Mussoorie. In England it is not uncommon even near London; it flies steadily and rather slow, and is found in ruins, roofs of churches, and sometimes old hollow trees.

No. 89. (VESPERUGO) SCOTOPHILUS LEISLERI.

Syn.—VESPERUGO LEISLERI.

The Hairy-armed Bat (*Jerdon's No.* 36).



Vesperugo leisleri.

HABITAT.—Himalayas.

DESCRIPTION.—Ears short, oval, triangular; tragus short, rounded at tip; membrane attached to base of outer toe; all toes short; membrane over the arms very hairy, some cross-lines of hair on the interfemoral membrane; fur long, deep fuscous brown at base, chestnut at the tip; beneath greyish brown.—*Jerdon.*

SIZE.—Head and body, 2¼ inches; tail, 3¾; expanse, 11½.

SCOTOPHILUS PACHYOMUS.

(*Jerdon's No.* 37.)

Synonymous with his No. 35; see Dobson's Monograph.

No. 90. (VESPERUGO) SCOTOPHILUS COROMANDELIANUS.

Syn.—VESPERUGO ABRAMUS; VESPERTILIO COROMANDELICUS.

The Coromandel Bat (*Jerdon's No.* 38).

HABITAT.—India generally, Burmah and Ceylon.

DESCRIPTION.—Ears triangular, rather large; outer margin straight or slightly concave; tragus lunate; feet small; wing membrane attached to the base of the toes; fur short, above dingy brown, the hairs tipped with a lighter tinge, paler beneath.

SIZE.—2½ inches, including tail, which is about 1⅛; wing expanse, 7½.

This is a very common little bat, akin to the English Pipistrelle, and is found everywhere in roofs, hollow bamboos, &c.

No. 91. (VESPERUGO) SCOTOPHILUS LOBATUS.

Syn.—VESPERUGO KUHLII.

The Lobe-eared Bat (*Jerdon's No.* 39).

HABITAT.—India generally.

DESCRIPTION.—Ears small, triangular; the base of the margin very convex forward; a triangular lobule above the base of the outer margin; tragus short and uniform in width; a short muzzle; wings from the base of the toes; feet small; calcaneum long; tip of tail free; fur blackish yellow above, ashy beneath.

SIZE.—Two and a-half inches, of which the tail is $1\frac{1}{4}$; expanse $7\frac{3}{8}$. Jerdon, quoting Tomes, states that this is the same as *V. Abramus*, but that is the synonym of the last species.

GENUS SCOTOPHILUS.

Muzzle short, bluntly conical, devoid of hair; ears longer than broad; tail shorter than the head and body; wing membrane attached to the base of the toes.

Dentition: Inc., $\frac{1-1}{6}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{1-1}{2-2}$; molars, $\frac{3-3}{3-3}$.

Jerdon's formula gives upper incisors 4.

No. 92. SCOTOPHILUS FULIGINOSUS.

The Smoky Bat (*Jerdon's No.* 40).

HABITAT.—Central Nepal.

DESCRIPTION (*apud* Hodgson).—"Feet very small, included in the wing membrane nearly to the end of the toes; ears acutely pointed, shorter than the head; muzzle groved, nudish; face sharp; rostrum somewhat recurved; wholly sooty brown; a little smaller than *Vesp. formosa*."

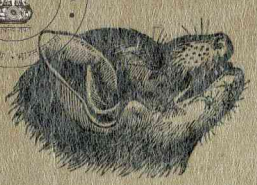
I cannot find this bat mentioned by any other author, and Jerdon says it does not seem to be recognised.

No. 93. SCOTOPHILUS TEMMINCKII.

Syn.—NYCTICEJUS TEMMINCKII (*Jerdon*).

HABITAT.—India generally; Burmah and Ceylon.

DESCRIPTION.—Ears short, rounded and narrow; tragus narrow



Scotophilus Temminckii.

curved and pointed inwards; muzzle thick, blunt and conical; the fur varies, sometimes dark olive brown, fulvous beneath, and occasionally chestnut, with a paler shade of yellow below.

SIZE.—Four and a-half inches, of which the tail is $1\frac{1}{2}$; expanse, 13.

A very common species, appearing early in the evening. Horsfield says of it that it collects by hundreds in hollow trees, and feeds chiefly on white ants.

No. 94. SCOTOPHILUS HEATHII.

HABITAT.—India and Ceylon (Rajanpore, Punjab).

DESCRIPTION.—Similar to the above, but longer in all its measurements (*Dobson*). Judging from drawings, the head and muzzle of this are more in a line than in the last species, the ears project forward, and are also larger, the tragus especially, and there is a greater width between the ears.

SIZE.—Five inches, of which the tail is 2.

No. 95. SCOTOPHILUS EMARGINATUS.

HABITAT.—India; precise locality unknown.

DESCRIPTION.—Head broad and flat; muzzle obtuse and thick; ears long and large, with rounded tips turning outwards; tragus short; thumb long with a strong claw; wing membrane quite devoid of hair, except on the interfemoral membrane, which is half covered; fur tricolored, first dark chestnut, buff, and then yellowish brown.

SIZE.—Head and body, $2\frac{1}{10}$ inches; tail, 2 inches.

No. 96. SCOTOPHILUS ORNATUS. *Syn.*—NYCTICEJUS ORNATUS.

HABITAT.—India and Burmah.

DESCRIPTION.—Head broad; muzzle short; ears triangular, erect, with rounded tips, and broadly rounded lobe at the base; tragus narrow, semi-lunate, curved towards the front; fur a light Isabelline brown, spotted with white; a white spot on the centre of the forehead, and from the back of the head down the spine for two-thirds of its length a narrow white streak; on each side of the body two white patches; a broad white collar, or rather demi-collar, from one ear spot to the other, passing under the throat. Dr. Dobson says the position of these patches is very constant, but the size varies, being greatest in individuals of a pale rusty red colour, and these he found always to be males.

SIZE.—Head and body, 3 inches; tail, 2 inches; expanse, 15.

No. 97. SCOTOPHILUS PALLIDUS.

HABITAT.—Mian Mir, Lahore.

DESCRIPTION.—Head and muzzle as in *S. Temminckii*; ears slightly shorter than the head; internal basal lobe convex, evenly rounded; tip broadly rounded off; tragus moderately long and rounded at the tip; a prominent triangular lobe at base. Wing membrane from base of toes; lobule at the heel very narrow and long; last rudimentary caudal vertebra free; fur of the body, wings, and interfemoral membrane pale buff thoughout.

SIZE.—Head and body, 2 inches; tail, 1·4 inch.

NOCTULINIA NOCTULA.

(See *ante: Vesperugo noctula—Jerdon's No.* 41.)

NYCTICEJUS HEATHII.

Large Yellow Bat (*Jerdon's No.* 42).

(See *ante: Scotophilus Heathii.*)

NYCTICEJUS LUTEUS.

The Bengal Yellow Bat (*Jerdon's No.* 43).

NYCTICEJUS TEMMINCKII.

The Common Yellow Bat (*Jerdon's No.* 44).

Both the above (Nos. 43 and 44) are, according to Dr. Dobson, synonymous with *Scotophilus Temminckii*, which see.

NYCTICEJUS CASTANEUS.

The Chestnut Bat (*Jerdon's No.* 45).

This is also a variety of *Scotophilus Temminckii.*

NYCTICEJUS ATRATUS.

The Sombre Bat (*Jerdon's No.* 46).

(See *ante: Vesperugo atratus.*)

NYCTICEJUS CANUS.

The Hoary Bat (*Jerdon's No.* 47).

(See *ante: Vesperugo lobatus.*)

NYCTICEJUS ORNATUS.

The Harlequin Bat (*Jerdon's No.* 48).

(See *ante: Scotophilus ornatus.*)

No. 98. NYCTICEJUS NIVICOLUS.

The Alpine Bat (*Jerdon's No.* 49).

HABITAT.—Sikim.

DESCRIPTION.—"Head and body above uniform light brown with a slight yellowish shade; underneath, from the throat to the vent, dark grey with a brownish tint, lighter on the sides of the throat. Ears long, attenuated to an obtuse point."—*Jerdon.*

SIZE.—Head and body, 3 inches; tail, 2 inches; expanse, 19 inches.

This bat was described by Hodgson ('Ann. Mag. Nat. Hist.' 1855), but there is some doubt about it, and it has been classed as a *Lasiurus* and also with *Scot. ornatus* and *Vesp. formosa*, but Jerdon thinks it a *distinct* species. I cannot find any mention of it in Dobson's monograph.

GENUS HARPIOCEPHALUS.

This is also the genus *Murina* of Gray. Dr. Dobson explains his acceptance of the former term in the following way: that he first accepted *Murina* on the score of priority in a paper showing that *Harpiocephalus* and *Murina* must be united in a single genus; but finding afterwards that Gray had founded *Murina* on a specimen of what he believed to be *Vesp. suillus* (Temm.), but which was in reality a specimen of a very different species from Darjeeling, belonging to the same section of the genus as *Vespertilio harpia* (Temm.) the type of his genus *Harpiocephalus*, it remained therefore either to discard both names or to retain *Harpiocephalus*, in which course he was supported by Professor Peters, to whom he mentioned the facts.

Horsfield's genus *Lasiurus* is included in this one, though Jerdon considers it distinct from *Murina.*

Muzzle elongated, conical; *nostrils prominent, tubular; produced beyond the upper-lip*, opening laterally or sublaterally, emarginate between; crown of the head scarcely raised above the face line; ears thin, generally covered with glandular papillæ; tragus long, attenuated towards the tip, and inclined outwards; thumb very large, with a large, strongly curved claw; wings around interfemoral membrane very hairy. —*Dobson.*

Dentition: Inc., $\frac{2-2}{6}$; can. $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$.

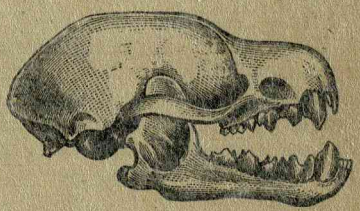
No. 99. HARPIOCEPHALUS HARPIA.

Lasiurus Pearsonii (*Horsfield*) (*Jerdon's No.* 50).

HABITAT.—Darjeeling and Khasia hills.

DESCRIPTION.—"Fur above very soft, silky, and rather long; colour on the head, neck, and shoulders brownish grey, with a ferruginous cast, variegated with whitish hairs; the rest of the body above, with the base of the membrane, the thighs and the interfemoral membrane, have a deep bay or reddish-brown hue, and delicate hairs of the same colour are scattered over the membrane and project from its border; the body underneath is thickly covered with a grey fur, which is paler on the breast and body; the interfemoral membrane marked with regularly parallel transverse lines" (*Horsfield*). Ears ovoid; tragus rather long, nearly straight, acute at the tip (*Jerdon*). Muzzle rather short, obtusely conical; end of nose projecting considerably beyond the lip, consisting of diverging tubular nostrils opening laterally, with a slight emargination between each (*Dobson*).

SIZE.—Head and body, 3 inches; tail, 1½ inch; expanse, 14. Hodgson, who procured it at Darjeeling, writes of it: "Entire legs and caudal membrane clad in fur like the body, which is thick and woolly. Colour bright rusty above; sooty below, the hairs tipped with hoary."



Skull of *Harpiocephalus harpia*.

This bat is, for its size, one of the most powerfully armed with teeth. The skull reminds one of that of a dog or hyæna in miniature; the teeth are very stout, the canines blunt and conical, and the cusps of the molars short and blunt, well coated with enamel; the jaws are correspondingly muscular and adapted to the food of the animal, which consists of hard-shelled beetles, the crushed cases of which have been found in its stomach.

No. 100. HARPIOCEPHALUS (MURINA) SUILLUS.

The Pig-Bat (*Jerdon's No.* 51).

HABITAT.—Darjeeling (*Jerdon*); Malayan archipelago.

DESCRIPTION.—Muzzle narrow, elongated; nostrils very prominent, which, viewed from below, resemble in shape a small hour-glass placed horizontally at the extremity of the muzzle; ears moderate, shorter than the head, rounded at the tips; tragus moderately long, attenuated above and slightly curved outwards; fur light greyish-brown; extremities dark brown; beneath light greyish-brown throughout.—*Dobson*.

SIZE.—Head and body, 1¾ to 2 inches; tail, 1½ inch; expanse 9 to 10.

No. 101. HARPIOCEPHALUS AURATUS.

HABITAT.—Thibet.

DESCRIPTION.—Head and muzzle as in *H. suillus*, but the nostrils are differently shaped; each nostril forms a distinct tube directed sub-laterally with a circular aperture marked by a very small notch on the outer and upper margin (*Dobson*). The whole body is thickly clad; the fur on the back is black, with bright golden yellow tips; the back of the fore-arm covered with short golden hair; the hair of the under parts black with silvery tips, whiter on the lower jaw, neck and pubis; the interfemoral membrane is covered with very long hair, which forms a fringe along its free margin extending on the legs and feet, and projecting beyond the toes; underneath short silvery hair.

SIZE.—Head and body 1·4 inch; tail 1·2.

No. 102. HARPIOCEPHALUS GRISEUS.

HABITAT.—Jeripani, N.W. Himalayas.

DESCRIPTION.—Head and muzzle as in *H. suillus;* fur above dark brown, with yellowish-brown extremities; beneath similar, but with the extreme points of the hairs ashy.

SIZE.—Head and body, 1·4 inch; tail 1 inch.

This bat was found near Mussoorie by Captain Hutton, who writes that it occurs, but sparingly, on the outer southern range of hills at 5500 feet. It skims close to the ground, and somewhat leisurely over the surface of the crops and grass; and one which flew into his room kept low down, passing under chairs and tables, instead of soaring towards the ceiling, as bats generally do.

No. 103. HARPIOCEPHALUS LEUCOGASTER.

HABITAT.—N.W. Himalayas, Thibet.

DESCRIPTION.—Head and muzzle as in *H. harpia;* fur long and dense, above brown with grey bases; underneath whitish; sides light brown. It differs from the next species by a small projecting tooth on the inner margin of the ear conch, by the smaller size of the first upper premolar, and by the colour.—*Dobson.*

SIZE.—Head and body, 1·9 inch; tail 1·5.

No. 104. HARPIOCEPHALUS CYCLOTIS.

HABITAT.—Darjeeling, Ceylon.

DESCRIPTION.—Similar to the last, but with round ears; fur bicoloured, the hairs being dark brown at the base, with bright ferruginous tips;

below pale brown; the upper surface of the interfemoral membrane and back of the feet covered with hair, which also extends beyond the toes; the first premolar in the upper jaw nearly equal in size to the second, whereas in the last species it is only about three-fourths.

SIZE.—Head and body, 1·7 inch; tail, 1·5.

GENUS KERIVOULA.

DESCRIPTION.—Muzzle long and narrow; skull very concave between the nasal bones and the vertex, so that the crown appears considerably vaulted; ears funnel-shaped and semi-transparent; tragus very long, narrow and pointed; wings very wide; tail longer than head and body, wholly contained within the interfemoral membrane.

Dentition: Inc., $\frac{2-2}{6}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{3-3}{3-3}$; molars, $\frac{3-3}{3-3}$.

The generic name of this bat is composed of two Singhalese words—*kehel* or *kela*, the plantain, and *voulha*, which is the Singhalese for bat, the specimen on which Gray founded his genus being the following:—

NO. 105. KERIVOULA PICTA.

The Painted Bat (*Jerdon's No.* 53).

HABITAT.—India generally, Burmah and Ceylon.

DESCRIPTION—"Fur fine, woolly; above yellowish-red or golden rufous, beneath less brilliant and more yellow; wing membranes inky black, with rich orange stripes along the fingers extending in indentations into the membrane."—*Jerdon.*

Ears moderate, laid forwards; the tips reach midway between the eyes and the middle of the muzzle; tragus very long and straight; thumb short; wings to the base of the toes.

SIZE.—Head and body, 1½ inch; tail, 1·6 inch; expanse about 10 inches.

This beautiful little bat is found all over India, but is not common; it is occasionally caught in plantain gardens, as it resorts to the leaves of that tree for shelter during the night, and may sometimes be discovered in the folds of a leaf. As Jerdon remarks, it looks more like a butterfly or a moth when disturbed during the day time. Dr. Dobson pertinently observes that the colours of this bat appear to be the result of the "protective mimicry" which we see so often in insects, the Mantidea and other genera, the colours being adapted to their abiding places. He alludes to Mr. Swinhoe's account ('P. Z. S.,' 1862, p. 357) of an allied species:—"The body of this bat was of an orange yellow, but the wings were painted with orange yellow and black. It was caught suspended head

downwards on a cluster of the round fruit of the longan tree. (*Nephelium* [*Scytalia*] *longanum*) [the *ash phul* of Bengal]. Now this tree is an evergreen, and all the year through some portion of its foliage is undergoing decay, the particular leaves being in such a stage partially orange and black; this bat can therefore at all seasons suspend from its branches and elude its enemies by its resemblance to the leaf of the tree." This bat was named by Pallas *Vespertilio pictus*. Boddaert in 1785 termed it *Vesp. kerivoula*, and Gray afterwards took the second specific name for that of the genus, leaving the first as it is.

KERIVOULA PALLIDA.

(*Jerdon's No.* 54.)

This is synonymous with *Vespertilio formosus*, which see further on, it is the same as the *Kerivoula formosa* of Gray.

No. 106. KERIVOULA PAPILLOSA.

(*Jerdon's No.* 55.)

HABITAT.—Java, but said by Jerdon to have been found in Calcutta and Ceylon.

DESCRIPTION.—Fur fine woolly, long, bicoloured; above light shining brown, paler below; the free edge of the interfemoral membrane margined with small papillæ.

No. 107. KERIVOULA HARDWICKII.

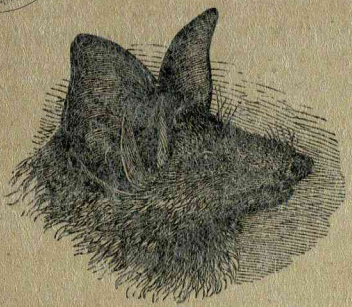
HABITAT.—India (Assam—Shillong, Khasia hills).

DESCRIPTION.—Same size as *K. picta*, but ears larger; fur uniformly dark above and below, with shining greyish-brown extremities.

GENUS VESPERTILIO.

Muzzle long; ears often larger than the head, oval, apart; tragus long, acute; crown of head vaulted; feet moderate; wing membrane from base of toes; tail, wholly included in interfemoral membrane, less than length of head and body.

Dentition: Inc., $\frac{2-2}{6}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{3-3}{3-3}$; molars, $\frac{3-3}{3-3}$.



Vespertilio murinus.

No. 108. MYOTIS (VESPERTILIO) MURINUS.

(*Jerdon's No.* 61.)

HABITAT.—N.W. Himalayas.

DESCRIPTION.—Fur above light reddish or smoke brown beneath darky white, the base of the hairs dark.

SIZE.—Head and body, 2½ inches; tail, 2 inches; expanse, 15 inches.

NOS. 109 & 110. MYOTIS THEOBALDI and MYOTIS PARVIPES.

(*Jerdon's Nos.* 62 & 63.)

Both these appear to be closely allied to the *pipistrelle* of Europe, and are stated to have been found at Mussoorie and in Kashmir.

No. 111. VESPERTILIO LONGIPES.

HABITAT.—Kashmir (caves of Bhima Devi, 6000 feet).

DESCRIPTION.—Wings from the ankles; *feet very large*, about one-fourth the length of the head and body; fur black above, underneath black with whitish tips.

SIZE.—Head and body, 1·75 inch; tail, 1·45 inch.

No. 112. VESPERTILIO MYSTACINUS.

HABITAT.—Himalayas.

DESCRIPTION.—Muzzle narrow; skull vaulted; ears as long as head wings from base of toes; fur dark brown.

No. 113. VESPERTILIO MURICOLA.

HABITAT.—Himalayas, Arracan.

DESCRIPTION.—Similar to the above, but may be distinguished by a small lobe behind the heel, by the deep emargination of the upper third of the outer margin of the ear; by the intensely black colour of the fur and membranes, and by its small size.—*Dobson.*

SIZE.—Head and body, 1·6 inch; tail, 1·55 inch.

No. 114. VESPERTILIO MONTIVAGUS.

HABITAT.—Burmah, Hotha, Yunan.

DESCRIPTION.—Head slightly elevated above the face line; muzzle obtuse; ears narrow, tapering, *with* rounded tips slightly turned outwards; tragus long, narrow, and acutely pointed; feet very small; toes two-thirds the length of the whole foot; tail wholly contained in the membrane; wings from base of toes; fur dark brown above, the tips paler and shining, beneath much darker, almost black, with ashy tips to the hairs; face much covered with hair, which almost conceals the eyes; the tip of the nose alone naked; wing membranes partially covered with fur.

SIZE.—Head and body, 1·8 inch; tail, 1·6 inch.

This bat, of which the above description is taken from Dobson's monograph, was obtained by Dr. J. Anderson during the Yunan Expedition.

No. 115. VESPERTILIO MURINOIDES.

HABITAT.—N.W. Himalayas (Chamba), 3000 feet.

DESCRIPTION.—General form of the ear triangular, with narrow rounded tips; outer margin concave beneath tips; tragus slender and acutely pointed, with a quadrangular lobe at the base of the outer margin; fur dark brown above with light brown tips; dark brown below, almost black with greyish tips.

SIZE.—Head and body, 2·5 inches; tail 2.

No. 116. VESPERTILIO FORMOSUS.

HABITAT.—N.W. Himalayas (Nepal, Darjeeling), Khasia hills.

DESCRIPTION.—Wing membrane broad and variegated with orange and rich dark brown; the portions of the dark-coloured membrane are triangular in form, and occupy the spaces between the second and third and third and fourth fingers; all the remaining portions of the membranes, including interfemoral, are orange, as are also the ears; the orange colour extends in narrow lines along each side of the fingers, and is dispersed over the dark triangular space in dots and streaks.

SIZE.—Head and body, 2 inches; tail, 1·1; expanse 11.

No. 117. VESPERTILIO NEPALENSIS.

HABITAT.—Khatmandu, Nepal.

DESCRIPTION.—Fur of head and back long and dense, bicoloured; base black, tips brown; underneath the hairs are two-thirds black, with the remaining upper third pure white.

SIZE.—Head and body, 1·65 inch; tail, 1·35.

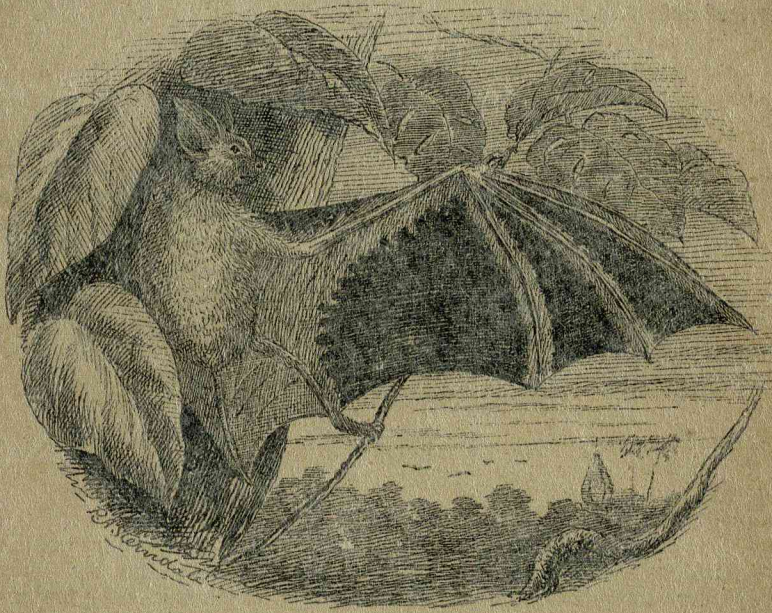
No. 118. VESPERTILIO EMARGINATUS.

VARIETY.—*Desertorum.*

HABITAT.—Beluchistan.

DESCRIPTION.—The upper third of the outer margin of the ears deeply emarginate; colour of fur light brownish; ears and interfemoral membranes pale yellowish white; membranes dusky white.

SIZE.—Head and body, 2 inches; tail 1·6.



Vespertilio formosus.

GENUS MINIOPTERUS (*Bonaparte*).

DESCRIPTION.—Crown of head abruptly and very considerably raised above the face line; ears separate, rhomboidal, the outer margin carried forward to the angle of the mouth; tragus like that in *Vesperugo*; first phalanx of the second or longest finger very short;

feet long and slender; tail as long as head and body, wholly contained in the membrane.

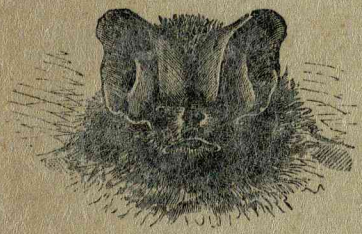
Dentition: Inc., $\frac{2-2}{6}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{3-3}$; molars, $\frac{3-3}{3-3}$.

No. 119. MINIOPTERUS SCHREIBERSII.

HABITAT.—Burmah and Ceylon.

DESCRIPTION.—Colour of fur varies, the basal half of the hair always dark greyish black, dark brown or black; the extremities varying from light grey to light reddish-grey, dark reddish-brown and black. For further details see Dobson's monograph.

GENUS BARBASTELLUS.



Synotus barbastellus.

Ears large, connate at the base in front, triangular, emarginate on the outer margin, broad, concealing the back of the head, hairy in the middle; tragus broad at the base, narrow at the tip, and curved outwardly.

Dentition: Inc., $\frac{2-2}{6}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{2-2}{2-2}$; molars, $\frac{3-3}{3-3}$.

No. 120. BARBASTELLUS COMMUNIS.

Jerdon's No. 65.)

HABITAT.—Himalayas, Nepal and Mussoorie.

DESCRIPTION.—Fur above blackish brown; the hairs fulvous at the tips; abdomen greyish brown; hairs fine silky.

SIZE.—Head and body, 2 inches; tail, $1\frac{3}{4}$; expanse; $10\frac{1}{2}$.—*Jerdon.*

This is the same as the English Barbastelle, and it appears in Dobson's monograph as *Synotus Darjeelinensis.*

No. 121. NYCTOPHILUS GEOFFROYI.

(*Jerdon's No.* 66.)

HABITAT.—Mussoorie.

Jerdon here goes back to the nose-leafed bats. I can find no trace of it in Dobson's monograph, which is so exhaustive as far as Asiatic species are concerned.

DESCRIPTION.—Over the eyes, at the hind corner, a tuft of black hair; fur dark brown, above throat and flank brownish-white; below black with white tips. A simple transverse nose-leaf; ears large, ovoid, united at base as in *Plecotus*.

SIZE.—Head and body, $1\frac{3}{4}$ to 2 inches; tail, $1\frac{5}{12}$; expanse, $9\frac{3}{4}$.

We have now concluded our notice of Indian bats but yet much is to be discovered concerning them. Very little is known of the habits of these small nocturnal animals, only a few of the most familiar large ones are such as one can discourse upon in a popular way; the lives and habits of the rest are a blank to us. We see them flit about rapidly in the dusky evening, and capture one here and there, but, after a bare description, in most cases very uninteresting to all save those who are "bat fanciers," what can be said about them? Many of them have been written about for a century, yet how little knowledge has been gained! It has been no small labour to collate all the foregoing species, and to compare them with various works; it would have been a most difficult task but for the assistance I have received from Dr. Dobson's book, which every naturalist should possess if he desires to have a thorough record of all the Indian Chiroptera.

INSECTIVORA.

These are mostly small animals of, with few exceptions, nocturnal habits.

Their chief characteristic lies in their pointed dentition, which enable them to pierce and crush the hard-shelled insects on which they feed. The skull is elongated, the bones of the face and jaw especially, and those of the latter are comparatively weak. Before we come to the teeth we may notice some other peculiarities of this order.

The limbs are short, feet five-toed and plantigrade, with the entire sole placed on the ground in running, and these animals are all possessed of clavicles which in the next order are but rudimentary; in this respect they legitimately follow the Bats. The mammæ are placed under the abdomen, and are more than two. None of them (except *Tupaia*) have a cæcum (this genus has been most exhaustively described in all its osteological details by Dr. J. Anderson: see his 'Anatomical and Zoological Researches'); the snout is usually prolonged and mobile. The dentition is eccentric, and not always easy to determine; some have long incisors in front, followed by other incisors along the sides of their narrow jaws and canines, all shorter than the molars; others have large separated canines, between which are placed small

incisors. In Blyth's additions to Cuvier he states that "in this group we are led to identify the canine tooth as simply the first of the false molars, which in some has two fangs, and, as in the Lemurs, to perceive that the second in the lower jaw is in some more analagous in size and character to an ordinary canine than that which follows the incisors. The incisor teeth are never more than six in number, which is the maximum throughout *placental* mammalia (as opposed by *marsupial*), and in several instances one or two pairs are deficient. (It should be remarked that a single tooth with two fangs is often represented by two separate teeth, each with one fang.) The canines, with the succeeding false molars, are extremely variable, but there are ordinarily three tuberculated molars posterior to the representative of the carnivorous or cutting grinder of the true *Carnivora*." All the molar teeth are studded with sharp points or cusps; the deciduous teeth are developed and disappear before birth. This order is divided into four families, viz., *Talpidæ* or Moles, *Soricidæ* or Shrews, *Erinaceidæ* or Hedgehogs, and the *Tupaiadæ*, Banxrings or Tree-shrews. Of all these well-defined types are to be found in India, but America and Africa possess various genera which we have not, such as the Condylures (*Condylura*, Illiger), the Shrew-moles (*Scalops*, Cuvier), belonging to *Talpidæ*; the Solendons, Desmans, and Chrysochlores to *Soricidæ*; the Sokinahs, Tenrecs and Gymnures to *Erinaceidæ*; and the Macroscelles or Elephant-mice of the Cape Colony form another group more allied to *Tupaia* than the rest. This last family is the most interesting. Anatomically belonging to this order, they externally resemble the squirrels so closely as to have been frequently mistaken for them. The grovelling Mole and creeping Shrew are as unlike the sprightly Tupaia, as it springs from branch to branch, whisking its long bushy tail, as it is possible to conceive. I intend further on to give an illustration of this little animal. The first we have on record concerning it is in the papers relating to Captain Cook's third voyage, which are now in the British Museum, where the animal is described and figured as *Sciurus dissimilis*; it was obtained at Pulo Condore, an island 100 miles from Saigon, in 1780.

Sir T. Stamford Raffles was the next to describe it, which he did under the generic name *Tupaia—tupai* being a Malayan word applied to various squirrel-like small animals—but he was somewhat forestalled in the publication of his papers by MM. Diard and Duvaucel. Dr. Anderson relates how Sir T. Raffles engaged the services of these two naturalists to assist him in his researches, on the understanding that the whole of the observations and collections were to be the property of the East India Company; but ultimately on this point there arose a disagreement between them, and the paper that was first read before the Asiatic Society of Bengal on the 10th of March, 1820, was drawn up by MM. Diard and Duvaucel, though forwarded by Sir T. Raffles, whose

own paper on the subject was not read before the Linnean Society until the 5th of December of that year, nor published till 1821; therefore to the others belongs the credit of first bringing this curious group to notice.

They regarded it in the light of a true Shrew, disguised in the form and habits of a squirrel, and they proposed for it the name *Sorex-Glis*, i.e. Shrew-squirrel (*Glis* properly means a dormouse, but Linnæus used it for his rodential group which he termed *Glires*); this was afterwards changed by Desmarest and Giebel to *Gli Sorex* and *Glisosorex*, which latter stands for one of the generic terms applied to the group. F. Cuvier, objecting to *Tupaia*, proposed *Cladobates* (signifying branch walkers), and Temminck, also objecting to *Tupaia*, suggested *Hylogale* (from Gr. *hyla*, forest, and *gale*, a weasel), so now we have four generic names for this one small group. English naturalists have however accepted *Tupaia*; and, as Dr. Anderson fairly remarks, though it is a pity that some definite rules are not laid down for the guidance of naturalists for the acceptance or rejection of terms, still those who reject *Tupaia* on the ground of its being taken from a savage tongue should be consistent, and refuse all others of similar origin. He is quite right; but how many we should have to reject if we did so—*Siamanga* in Quadrumana, *Kerivoula* in Cheiroptera, *Tupaia* in Insectivora, *Golunda* in Rodentia, *Rusa* in Ruminantia, and others! At the same time these names are wrong; they convey no meaning; and had they a meaning (which only *Kerivoula* or *Kelivoulha*, i.e. plantain-bat, has) it is not expressed in languages common to all western nations, such as the Latin and Greek. *Tupaia* is an unfortunate selection, inasmuch as it does not apply to one type of animal, but reminds me somewhat of the Madras *puchi*, which refers, in a general way, to most creeping insects, known or unknown.

FAMILY TALPIDÆ—THE MOLES.

These animals have a small cylindrical body, very short arm attached to a large shoulder-blade, supported by a stout clavicle or collar-bone. The fore-feet are of great breadth, suppported by the powerful muscles of the arm; the palm of the foot or hand is directed outwards or backwards, the lower edge being trenchant, with scarcely perceptible fingers armed with long, flat nails, strong and sharp, with which to tear up the ground and shovel the earth aside. The hind feet are small and weak in comparison, with slender claws. The head tapers to a point, the long snout being provided with a little bone which assists it in rooting, and the cervical muscles are very strong. The eyes are microscopical.

and almost concealed in the fur. At one time it was a popular delusion that the mole was devoid of the power of sight, but this is not the case. The sense of hearing is extremely acute, and the tympanum is large, although externally there is no aural development. The tail is short, the fur set vertically in the skin, whence it is soft and velvety. The bones of the pubis do not join, and the young when produced are large. The mammæ are six in number. The jaws are weak, the incisors are six above and eight below. The canines (false molars ?) have two roots. There are four false molars above and three below, and three molars with pointed cusps.

Moles live principally on earth-worms, snails, and small insects, though they are also said to devour frogs and small birds. They are more common in Europe than in India, where the few known species are only to be found in hilly parts. I have, I think, procured them on the Satpura range some years ago, but I cannot speak positively to the fact at this lapse of time, as I had not then devoted much attention to the smaller mammalia, and it is possible that my supposed moles were a species of shrew.

They are seldom if ever trapped in India, for the simple reason that they are not considered worth trapping, and the destruction of moles in England has long been carried on in the same spirit of ignorance which led farmers, both there and in France, to destroy small birds wholesale, till they did themselves much injury by the multiplication of noxious insects. Moles, instead of being the farmers' foes, are the farmers' friends. Mr. Buckland in his notes to Gilbert White's 'Natural History of Selborne' (Macmillan's *édition de luxe* of 1876)—says: "After dinner we went round the sweetstuff and toy booths in the streets, and the vicar, my brother-in-law, the Rev. H. Gordon, of Harting, Petersfield, Hants, introduced me to a merchant of gingerbread nuts who was a great authority on moles. He tends cows for a contractor who keeps a great many of the animals to make concentrated milk for the navy. The moles are of great service; eat up the worms that eat the grass, and wherever the moles have been afterwards the grass grows there very luxuriantly. When the moles have eaten all the grubs and the worms in a certain space, they migrate to another, and repeat their gratuitous work. The grass where moles have been is always the best for cows." In another place he says: "M. Carl Vogt relates an instance of a landed proprietor in France who destroyed every mole upon his property. The next season his fields were ravaged with wire-worms, and his crops totally destroyed. He then purchased moles of his neighbours, and preserved them as his best friends."

The poor little despised mole has had its part to play in history. My readers may remember that William the Third's horse is supposed to have put his foot into a mole-pit, and that the king's death was

shortened by the unconscious agency of "the little gentleman in black," who was so often toasted afterwards by the Jacobites.

No. 122. TALPA MICRURA.

The Short-tailed Mole (*Jerdon's No.* 67).

HABITAT.—The Eastern Himalayan range.

NATIVE NAMES.—*Pariam*, Lepcha; *Biyu-kantyen*, Bhotia (*Jerdon*).

DESCRIPTION.—Velvety black, with a greyish sheen in certain lights; snout nude; eyes apparently wanting. Jerdon says there is no perforation of the integument over the eyes, but this I doubt, and think that by examination with a lens an opening would be discovered, as in the case of the Apennine mole, which M. Savi considered to be quite blind. I hope to have an opportunity of testing this shortly. The feet are fleshy white, also the tail, which, as its specific name implies, is very small. "There are three small upper premolars between the quasi-canine tooth and the large scissor-toothed premolar, which is much developed."

SIZE.—Length, $4\frac{3}{4}$ to 5 inches; head alone, $1\frac{3}{4}$; palm with claws, $\frac{7}{8}$ inch; tail, $\frac{3}{16}$ of an inch or less.

Jerdon says: "This mole is not uncommon at Darjeeling, and many of the roads and pathways in the station are intersected by its runs, which often proceed from the base of some mighty oak-tree to that of another. If these runs are broken down or holes made in them they are generally repaired during the night. The moles do not appear to form mole-hills as in Europe." Jerdon's specimens were dead ones picked up, as the Lepchas do not know how to trap them.

No. 123. TALPA MACRURA.

The Long-tailed Mole (*Jerdon's No.* 68).

HABITAT.—Sikim.

DESCRIPTION.—Deep slaty blue, with a whitish or hoary gloss, iridescent when wet; the tail covered with soft hair.

SIZE.—Head and body, 4 inches; tail, $1\frac{1}{4}$ inch; head alone, $1\frac{1}{8}$ inch; palm, $\frac{3}{4}$ inch.

No. 124. TALPA LEUCURA (*Blyth*).

The White-tailed Mole.

HABITAT.—Sylhet, Burmah (Tenasserim).

DESCRIPTION.—Similar to *micrura*, but with a short tail covered with white hairs, and it has one premolar less.

FAMILY SORECIDÆ.

Small animals, which from their size, shape, and nocturnal habits are frequently confounded with rats and mice, as in the case of the common Indian Shrew, known to most of us as the Musk-rat; they have distinct though small eyes, distinct ears, the conch of which is like that of a mouse. The tail *thick* and tapering, whence the generic name *Pachyura*, applied by De Selys Longchamp, and followed latterly by Blyth; but there is also a sub-family of bats to which the term has been applied. "On each flank there is a band of stiff closely-set bristles, from between which, during the rutting season, exudes an odorous fluid, the product of a peculiar gland" (*Cuvier*); the two middle superior incisors are hooked and dentated at the base, the lower ones slanted and elongated; five small teeth follow the larger incisors on the upper jaw, and two those on the lower. There are three molars with sharp-pointed cusps in each jaw, with a small tuberculous tooth in the upper. The feet are five-toed, separate, not webbed like the moles; the snout is long and pointed and very mobile.

This family has been subdivided in various genera by naturalists, each one having his followers; and it is puzzling to know which to adopt. Simplicity being the great point to aim at in all these matters, I may broadly state that Shrews are divided into land and water shrews (*Sorex* and *Hydrosorex*); the former includes *Crocidura* of Wagner, *Corsira* of Gray, and *Anurosorex* of Milne-Edwards, the latter *Crossopus* and *Chimarrogale*, Gray.

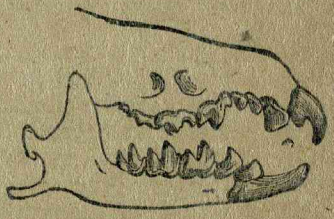
For ages both in the West and East this poor little amimal has been the victim of ignorance. In England, even in the last century, it was looked upon as an evil thing, as Gilbert White says: "It is supposed that a shrew-mouse is of so baneful and deleterious a nature that wherever it creeps over a beast, be it horse, cow, or sheep, the suffering animal is afflicted with cruel anguish, and threatened with loss of the use of the limb," the only remedy in such cases being the application of the twigs of a shrew ash, which was an ash-tree into which a large hole had been bored with an augur, into which a poor little shrew was thrust alive and plugged up (*see* Brand's 'Popular Antiquities' for a description of the ceremonies). It is pleasant to think that such barbarities have now ceased, for though shrew ashes are to be found in various parts of England, I have never heard (in my own county, Derbyshire, at least) of the necessity for their use. In an article I contributed to a magazine some thirteen years ago, I pointed out a coincident superstition prevailing in India. Whilst marching as a Settlement officer in the district of Seonee, I noticed that one of my camels had a sore back and

inquiring into the cause was told by the natives that a musk-rat (our commonest shrew) had run over him. Jerdon also remarks that in Southern India (Malabar) the bite of *S. murinus* is considered venomous, and so it is in Bengal.

GENUS SOREX (*Linn.*).

SYNONYM.—*Pachyura*, De S. Long; *Crocidura*, Wagner.

DESCRIPTION.—Upper front teeth large; "inferior incisors entire, or rarely so much as the trace of a serrated upper edge;" between these and the first cutting molar four teeth as follows: large, small, middling, very small; teeth wholly white; tail thick and tapering, with a few scattered hairs, some with glands secreting a pungent musky odour, some without.



Dentition of Shrew (magnified).

No. 125. SOREX CÆRULESCENS.

The Common Musk Shrew, better known as Musk-rat.

NATIVE NAME.—*Chachhunder*, Hind.; *Sondeli*, Canarese.

HABITAT.—India generally.

DESCRIPTION.—Bluish gray, sometimes slightly mouse-coloured: naked parts flesh-coloured.

SIZE.—Head and body, 6 to 7 inches; tail $3\frac{1}{2}$ to 4 inches.

This little animal is almost too well known, as far as its appearance is concerned, to need much description, though most erroneous ideas prevail about its habits. It is proverbially difficult to uproot an old-established prejudice; and, though amongst my friends I have been fighting its battles for the poor little shrew for years, I doubt whether I have converted many to my opinions. Certainly its appearance and its smell go strongly against it—the latter especially—but even here its powers are greatly exaggerated. I think by this time the old fallacy of musk-rats tainting beer and wine in bottles by simply running over them is exploded. When I came out in 1856 it was a common thing at the mess table, or in one's own house, to reject a bottle of beer or wine, because it was "musk-ratty;" but how seldom is the complaint made now since country-bottled beverages are not used? Jerdon, Kellaart, and every Indian naturalist scouts the idea of this peculiar power to do what no chemist has yet succeeded in, viz., the creation of an essence subtle enough to pass through glass. That musky bottles were frequent for-

merly is due to impregnated corks and insufficient washing before the bottle was filled. The musk-rat in a quiescent state is not offensive, and its odour is more powerful at certain seasons. I am peculiarly sensitive to smells, and dislike that of musk in particular, yet I have no objection to a musk-rat running about my room quietly if I do not startle him. I never allow one to be killed, and encourage their presence in the house, for I think the temporary inconvenience of a whiff of musk is amply repaid by the destruction of the numerous objectionable insects which lurk in the corners of Indian houses. The notion that they do damage by gnawing is an erroneous one, the mischief done by mice and rats being frequently laid to their charge; they have not the powerful dentition necessary for nibbling through wood and mortar. In my book on 'Camp Life in Seonee,' I say a good word for my little friends, and relate as follows an experiment which I tried many years ago: "We had once been talking at mess about musk-rats; some one declared a bottle of sherry had been tainted, and nobody defended the poor little beast but myself, and I was considerably laughed at. However, one night soon after, as I was dressing before dinner, I heard a musk-rat squeak in my room. Here was a chance. Shutting the door, I laid a clean pocket-handkerchief on the ground next to the wall, knowing the way in which the animal usually skirts round a room; on he came and ran over the handkerchief, and then, seeing me, he turned and went back again. I then headed him once more and quietly turned him; and thus went on till I had made him run over the handkerchief five times. I then took it up, and there was not the least smell. I then went across to the mess house, and, producing the handkerchief, asked several of my brother officers if they could perceive any peculiar smell about it. No, none of them could. 'Well, all I know is,' said I, 'that I have driven a musk-rat five times over that pocket-handkerchief just now.'"

When I was at Nagpore in 1864 I made friends with one of these shrews, and it would come out every evening at my whistle and take grasshoppers out of my fingers. It seemed to be very short-sighted, and did not notice the insect till quite close to my hand, when, with a short swift spring, it would pounce upon its prey.

A correspondent of *The Asian*, writing from Ceylon, gives an account of a musk-rat attacking a large frog, and holding on to it in spite of interference.

McMaster says that these shrews will also eat bread, and adds: "insects, however, form their chief diet, so they thus do us more good than harm. I once disturbed one that evidently had been eating part of a large scorpion."

No. 126. SOREX MURINUS.

The Mouse-coloured Shrew (*Jerdon's No.* 70).

HABITAT.—India generally, Burmah and Ceylon.

DESCRIPTION. Brownish-grey above, paler beneath; fur coarser and longer than in the last species, and in the young ones the colour is more of a bluish-grey, browner on the back. The ears are larger than those of *S. cærulescens;* tail nearly equal to the body, thick at the base, and sparsely covered with long coarse hairs; feet and tail flesh-coloured in the living animal.

SIZE.—Head and body about 6 inches; tail, $3\frac{1}{2}$ inches.

"This," as Jerdon says, "is the common musk-rat of China, Burmah, and the Malayan countries, extending into Lower Bengal and Southern India, especially the Malabar Coast, where it is said to be the common species, the bite of which is considered venomous by the natives." Kellaart mentions it in Ceylon as the "common *musk shrew* or rat of Europeans;" but he confuses it with the last species. He gives the Singhalese name as "*koone meeyo.*" The musky odour of this species is less powerful, and is almost absent in the young. Blyth states that he was never able to obtain a specimen of it in Lower Bengal, yet the natives here discriminate between the light and dark-coloured shrews, and hold, with the people of Malabar, that the bite of the latter is venomous. Horsfield states that it has been found in Upper India, Nepal, and Assam, and he gives the vernacular name in the last-named country as "*seeka.*"

No. 127. SOREX NEMORIVAGUS.

The Nepal Wood Shrew (*Jerdon's No.* 71).

HABITAT.—Nepal.

DESCRIPTION.—Differs from the last "by a stouter make, by ears smaller and legs entirely nude, and by a longer and more tetragonal tail; colour sooty black, with a vague reddish smear; the nude parts fleshy grey; snout to rump, $3\frac{5}{8}$ inches; tail, 2 inches, planta, $\frac{11}{16}$ inch. Found only in woods and coppices."—*Hodgson.*

No. 128. SOREX SERPENTARIUS.

The Rufescent Shrew (*Jerdon's No.* 72).

HABITAT.—Southern India, Burmah and Ceylon.

DESCRIPTION.—Colour dusky greyish, with rufous brown tips to the hairs (*Blyth*). Above dusky slate colour with rufescent tips to the fur; beneath paler, with a faint rufous tinge about the breast (*Jerdon*).

Fur short ashy-brown, with a ferruginous smear on the upper surface, beneath a little paler coloured (*Kellaart*). Teeth and limbs small; tail slender.

SIZE.—Head and body about 4½ inches; tail, 2 inches; skull, $1\frac{2}{10}$ inch.

The smell of this musk shrew is said by Kellaart, who names it *S. Kandianus*, to be quite as powerful as that of *S. cærulescens*. Blyth seems to think that this animal gets more rufescent with age, judging from two examples sent from Mergui. By some oversight, I suppose, he has not included this species in his 'Catalogue of the Mammals of Burmah.'

No. 129. SOREX SATURATIOR.

The Dark Brown Shrew (*Jerdon's No.* 73).

HABITAT.—Darjeeling.

DESCRIPTION.—"Colour uniform deep brown, inclining to blackish, with a very slight rufescent shade; fur short, with an admixture of a few lengthened piles, when adpressed to the body smooth, but reversed somewhat harsh and rough; tail cylindrical, long, gradually tapering; mouth elongated, regularly attenuated, ears moderate, rounded."

SIZE.—Head and body, 5½ inches; tail, 3 inches.

Jerdon seems to think this is the same as *S. Griffithi* or closely allied; I cannot say anything about this, as I have no personal knowledge of the species, but on comparison with the description of *S. Griffithi* (which see further on) I should say they were identical.

No. 130. SOREX TYTLERI.

The Dehra Shrew (*Jerdon's No.* 74).

HABITAT.—Dehra Doon.

DESCRIPTION.—"Light rufescent sandy brown, paler beneath; unusually well clad even on the feet and tail, this last being covered with shortish fur having numerous long hairs intermixed; form very robust; basal portion of tail very thick."

SIZE.—Head and body, 4½ inches; tail, 2¾ inches; hind foot, ⅞ inch.

No. 131. SOREX NIGER.

The Neilgherry Wood Shrew (*Jerdon's No.* 75).

HABITAT.—Ootacamund, Neilgherry hills.

DESCRIPTION.—"Blackish-brown, with a rufescent shade on the upper parts; abdomen greyish; tail equal in length to the entire animal, exclusive of the head, gradually tapering to a point; snout greatly attenuated. Length of head and body, 3½ inches; of the tail, 2½ inches." —*Horsfield.*

No. 132. SOREX LEUCOPS.

The Long-tailed Shrew (Jerdon's No. 76).

HABITAT.—Nepal.

DESCRIPTION.—Uniform blackish-brown colour; tail very long and slender, exceeding in length the head and body, terminating in a whitish tip of half an inch long.

SIZE.—Head and body, 3 inches; tail, 2½ inches. Jerdon supposes that it is found at great altitudes, from Hodgson having in another place described it (MSS.) under the name *nivicola*.

No. 133. SOREX SOCCATUS.

The Hairy-footed Shrew (Jerdon's No. 77).

HABITAT.—Nepal, Sikim, Mussoorie.

DESCRIPTION.—According to Hodgson, nearly the size of *S. nemorivagus*, "but distinguished by its feet being clad with fur down to the nails, and by its depressed head and tumid bulging cheeks (mystaceal region); ears large and exposed; colour a uniform sordid or brownish-slaty blue, extending to the clad extremities; snout to rump, 3½ inches; tail, 2⅝ inches; planta, 1⅜ inch. This animal was caught in a wood plentifully watered, but not near the water. It had no musky smell when brought to me dead."

No. 134. SOREX MONTANUS.

The Ceylon Black Shrew.

HABITAT.—Ceylon, mountainous parts.

DESCRIPTION.—"Fur above sooty black without any ferruginous smear, beneath lighter coloured; whiskers long, silvery grey; some parts of legs and feet greyish, clothed with adpressed hairs; claws short, whitish; ears large, round, naked; outer margin lying on a level with the fur of the head and neck, the ears being thus concealed posteriorly; tail tetragonal, tapering, shorter than head and body."—*Kellaart.*

SIZE.—Head and body, 3¾ inches; tail, 2¼ inches; hind feet, ⅓ inch.

No. 135. SOREX FERRUGINEUS.

The Ceylon Rufescent Shrew.

HABITAT.—Ceylon, Dimboola, below Newara Elia.

DESCRIPTION.—"Colour uniform dusky or dusky slate, with the tips of the fur rufescent; fur long; large sebaceous anal glands; smell very powerful."—*Kellaart.*

SIZE.—Head and body, 3¾ inches; tail, 2¼ inches.

No. 136. SOREX GRIFFITHI.

The Large Black Shrew.

HABITAT.—Khasia hills and Arracan.

DESCRIPTION.—"Deep blackish-brown, with a slight rufous reflection in a certain light; fur short, close, soft, and adpressed; tail thick at the base, with a few long very slender straggling hairs along its entire length; ears small and rounded; snout elongated."—*Horsfield.*

SIZE.—Head and body, 5¾ inches; tail, 2½ inches.

Horsfield puts this down as having been found in Afghanistan by Griffiths, but this is an error owing to Griffiths' Afghanistan and Khasia collections having got mixed up.

No. 137. SOREX HETERODON.

HABITAT.—Khasia hills.

DESCRIPTION.—"Very similar to *S. soccatus* in general appearance, but less dark coloured, with shorter fur, and pale instead of blackish feet and tail underneath; the feet too are broader, especially the hind feet, and they have a hairy patch below the heel" (*Blyth*). The skull is narrower, and the upper incisors less strongly hooked.

GENUS FEROCULUS.

Teeth small; upper incisors shorter and less strongly hooked than in restricted *Sorex;* posterior spur large; lower incisors serrated with three coronal points. Feet very large.

No. 138. FEROCULUS MACROPUS.

The Large-footed Shrew.

HABITAT.—Ceylon.

DESCRIPTION.—Fur, long, soft uniform blackish-faint rufescent tinge.

SIZE.—Head and body 4¼ inches; tail 2¼.

The following species are of a more diminutive type, and are commonly called "pigmy-shrews;" in other respects they are true shrews.

No. 139. SOREX HODGSONI.

The Nepal Pigmy-Shrew (*Jerdon's No.* 78).

HABITAT.—Nepal and Sikim.

DESCRIPTION.—Brown, with a slight tinge of chestnut; feet and tail furred; claws white.

SIZE.—Head and body 1½ inch; tail, 1 inch.
Found in coppices and fields; rarely entering houses.

No. 140. SOREX PERROTETI.

The Neilgherry Pigmy-Shrew (*Jerdon's No.* 79).

HABITAT.—Neilgherry hills, probably also other parts of Southern India.

DESCRIPTION.—"Back deep blackish-brown; belly pale; limbs and feet brown; palms and plantæ clad with hairs; ears large, conspicuous."

SIZE.—Head and body, 1 1/2 inch; tail, 1/2 inch.

No. 141. SOREX MICRONYX.

The Small-clawed Pigmy-Shrew (*Jerdon's No.* 80).

HABITAT.—West Himalayas, Kumaon, Mussoorie.

DESCRIPTION.—Claws very minute, with fine hairs impending them, only to be detected by a lens; fur paler and more chestnut-brown than any other of these minute shrews, and more silvery below.

SIZE.—Head and body, 1⅝ inch; tail 1⅛ inch.

No. 142. SOREX MELANODON.

The Black-toothed Pigmy-Shrew (*Jerdon's No.* 81).

HABITAT.—Calcutta.

DESCRIPTION.—Called *melanodon* from the remarkable colouring of its teeth, which are piceous and white-tipped; colour uniform fuscous, scarcely paler beneath.

SIZE.—Head and body, 1⅞ inch; tail, 1 1/16 inch.

No. 143. SOREX NUDIPES.

The Naked-footed Shrew.

HABITAT.—Tenasserim.

DESCRIPTION.—"Remarkable for its naked feet and very large ears; also for the odoriferous glands on the sides being strongly developed, whereas we can detect them in no other of these minute species" (*Blyth*). Colour brown above, a little grizzled and glistening, more silvery below.

SIZE.—Head and body, 1¾ inch; tail, 1 1/16 inch.

No. 144. SOREX ATRATUS.

The Black Pigmy-Shrew.

HABITAT.—Khasia hills.

DESCRIPTION.—"Very dark colour, extending over the feet and tail

which is even *blackish underneath*; fur blackish-brown above, a little tinged rufescent, and with dark greyish underneath; the feet and tail conspicuously furred, beside the scattered long hairs upon the latter." —*Blyth.*

This species was determined by Blyth on a single specimen, which was found without its head, impaled by some shrike upon a thorn at Cherrapunji. The same thing occasionally occurs in England, when the common shrew may be found impaled by the rufous-backed shrike (*Lanius collurio*).

SUB-GENUS SORICULUS (Blyth).

The foregoing species being of the *white-toothed* variety (with the exception of *S. melanodon*, which, however, exhibits coloration decidedly the *reverse* of the following type), we now come to the shrews with teeth tipped with a darker colour; the dentition is as in the restricted shrews, with the peculiarity of colour above mentioned. The hind feet of ordinary proportions, unadapted for aquatic habits, and the tail slender and tapering, like that of a mouse, instead of being cylindrical with a stiff brush at the end.

No. 145. SORICULUS NIGRESCENS.

The Mouse-tailed Shrew (Jerdon's No. 82).

HABITAT.—Sikim and Nepal.

DESCRIPTION.—"Above dark-blackish or blackish-brown, slightly tinged rufescent, and with a silvery cast in certain lights; beneath greyish-black" (*Jerdon*). Feet and claws pale; tail slender, straight and naked.

SIZE.—Head and body, 3¼ inches; tail, 1½ inch; hind foot, ⅝ inch.

Jerdon says that Kellaart named an allied species from Ceylon *Corsira newera ellia*, but I have not been able to find it in his 'Prodromus Faunæ Zeylanicæ,' nor elsewhere.

GENUS CROSSOPUS (Wagner).

The hind feet large; the lower surface, as also of the tail, fringed with stiff hairs; tail somewhat compressed towards the tip; habits aquatic.

No. 146. CROSSOPUS HIMALAICUS.

The Himalayan Water-Shrew (Jerdon's No. 83).

NATIVE NAMES.—*Oong lagniyu*, Lepcha; *Choopitsi*, Bhot.

HABITAT.—Darjeeling.

DESCRIPTION.—Fur dark brown above, paler beneath; rusty brown on the lower part of throat and middle of belly, according to Jerdon; slate coloured back with scattered long hairs, which are longer and white-tipped on the sides and rump, according to Blyth's memoir; ears very small, hairy, concealed; tail long, slender, fringed with stiff whitish hair beneath; whiskers long and brown.

SIZE.—Head and body, 5 to 6 inches; tail about 3½ inches; hind foot, ¾ to ⅞ inch.

Jerdon procured this water-shrew at Darjeeling in the Little Rungeet river; it is said to live on small fish, tadpoles, water insects, &c. The movements of the English water-shrew, when swimming, are very agile. It propels itself by alternate strokes of its hind feet, but with an undulating motion, its sides being in a manner extended, and body flattened, showing a narrow white border on each side; then the fur collects a mass of tiny air bubbles which make the submerged portion glow like silver. It prefers clear still water, but at the same time will make its way up running streams and ditches, and occasionally wanders away into fields, and has been found in houses and barns.

Its food is principally aquatic insects, worms, molluscа, and fresh-water crustacea. In Bell's 'British Quadrupeds' its mode of poking about amongst stones in search of fresh-water shrimps (*Gammarus pulex*) is well described. Mr. F. Buckland states that he once dissected a water-shrew and found the intestines to contain a dark fluid pulpy matter, which, on being examined by a microscope, proved to consist entirely of the horny cases and legs of minute water insects. Continental writers declare that it will attack any small animal that comes in its way, giving it quite a ferocious character, and it is said to destroy fish spawn. I can hardly believe in its destroying large fish by eating out their brain and eyes. Brehm, who gives it credit for this, must have been mistaken. I have also read of its attacking a rat in a trap which was dead, and was discovered devouring it, having succeeded in making a small hole through the skin.

In England this animal breeds in May. The young are from five to seven in number, and are brought forth in a small chamber in the bank, which is constructed with several openings, one of which is usually under the level of the water.

Dr. Anderson has very fully described the Himalayan species under the name of *Chimarrogale Himalaica*. He caught a specimen in a mountain stream at Ponsee in the Kakhyen hills, 3500 feet above the sea level, and observed it running over the stones in the bed of the stream and plunging freely into the water hunting for insects.

GENUS NYCTOGALE.

Head and skull as in *Soricidæ*, but with palmated feet and compressed tail, as in *Myogalidæ*. Special characteristic, large pads on the soles of the feet, which form sucking discs.

No. 147. NYCTOGALE ELEGANS.

The Thibet Water-Shrew.

HABITAT.—Moupin in Thibet.

DESCRIPTION.—Fur of two kinds, a soft under down of slaty grey colour through which pass longer hairs, grey at the base with white tips, "causing the animal to vary considerably in appearance according as these hairs are raised or laid flat;" ears quite concealed, and without a conch; tail stout, longer than the body, quadrangular at the base, then triangular, and finally flattened; feet large and palmated, with large pads on the soles, depressed in the middle, forming sucking discs, which are a peculiar characteristic of this animal.

SIZE.—Head and body about 3½ inches; tail about 4 inches. Though this is not properly an Indian animal, I have thought fit to include it as belonging to a border country in which much interest is taken, and which has as yet been imperfectly explored.

GENUS CORSIRA.

Of Gray, *Amphisorex* of Duvernoy; differs in dentition from the last in having the lower quasi-incisors serrated with three or four coronal points, and the anterior point of the upper incisors not prolonged beyond the posterior spur, tipped with ferruginous; the lateral small teeth in the upper jaw are five in number, diminishing in size from the first backwards. Tail cylindrical, not tapering, and furnished with a stiffish brush at the extremity. The common British land-shrew is of this type.

No. 148. CORSIRA ALPINA.

The Alpine Shrew (Jerdon's No. 84).

HABITAT.—Darjeeling.

DESCRIPTION.—Deep blackish brown, very slightly rufescent in certain lights; tail slender, nearly naked, very slightly attenuated, compressed at the tip.

SIZE.—Head and body, 2½ inches; tail 2½ inches.

This is identical with the European Alpine shrew; the *Sorex caudatus* of Horsfield's Catalogue (No. 148), which was a specimen named by Hodgson, is also the same animal.

GENUS ANUROSOREX.

Remarkably for its large head, nude, scaly extremities, and extremely short, nude, scaly tail. "The structure of the ear, limbs and tail has special reference to a burrowing animal—the ear being valvular, so that it may be effectually closed against the entrance of foreign substances, and the feet devoid of hair, but scaly, and the tail reduced to very small dimensions. The eye is also excessively small, and buried deep in the dense silky fur. The hind feet, contrary to what is almost invariably the case in burrowing mammals, are larger than the fore feet." —*Anderson.*

No. 149. ANUROSOREX ASSAMENSIS.

The Assam Burrowing Shrew.

HABITAT.—Assam, Thibet.

DESCRIPTION.—General colour dark slaty, faintly washed with brownish rusty on the long hairs of the rump; fur long and silky, longest over the rump; occasional long brown hairs with pale tips are scattered over the body; long whiskers, yellow claws; naked parts of snout, limbs and tail flesh-coloured.

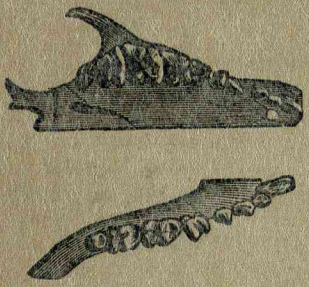
SIZE.—Head and body nearly 3 inches; tail, ½ inch; forefoot, ⅓ inch; hind foot, ⅓ inch.

The skull and dentition of this animal are essentially soricine. The Thibetan species (*A. squamipes*) is described as being over four inches in length, of a greyish colour, with a greenish-brown tinge; feet and nails whitish. It lives in burrows which it digs in the earth. I think it should properly come after the moles, which it resembles in some particulars.

FAMILY ERINACEIDÆ—THE HEDGEHOGS.

The molar teeth broad; the hinder ones nearly square, the tubercles on their upper surface rounded; the other teeth are three incisors on each side, of which the inner one is considerably larger than the rest; behind these, separated by a little gap, come three premolars gradually increasing in size, then one having much the appearance of a true molar, but furnished with a cutting edge; then three molar teeth, two of which are nearly square with strong tubercles. The last molar is

small." In the lower jaw the lowermost incisor is very large, and projects almost horizontally forwards, and it is followed by three small teeth now acknowledged to be premolars, with another large premolar, which is of the nature of a carnassial or cutting tooth acting on the one in the upper jaw. Then three molars as above, two large and one small, but with sharp tubercles. The skull has a more carnivorous form; it has "a complete zygomatic arch, and the tympanic bone forms a bundle-like swelling on each side of the back of the skull." Feet pentadactylous or five-toed; legs very short. The tibia and fibula (two bones of the shank) are joined together. The back is clothed with hair intermixed with sharp spines or bristles. Tail short or wanting entirely.



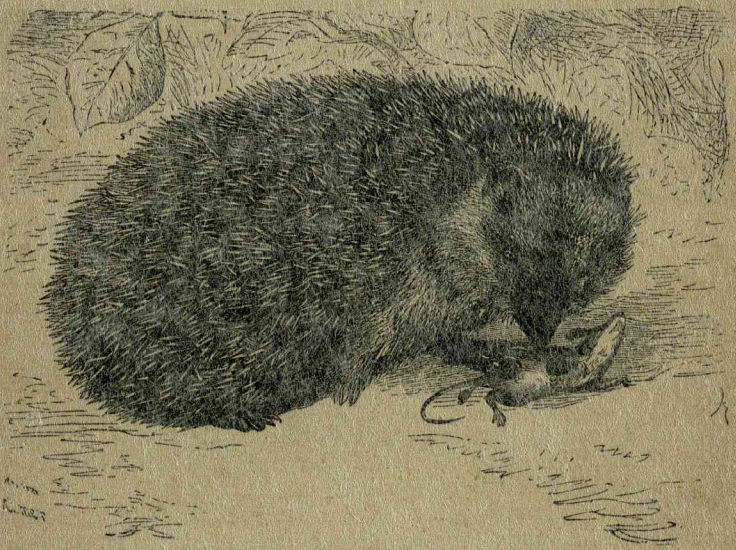
Dentition of Hedgehog.

GENUS ERINACEUS.

The European hedgehog is well known to most of us. Few boys who have lived a country life have been without one at some time or other as a pet. I used to keep mine in a hole at the root of an old apple-tree, which was my special property, and they were occasionally brought into the house at the cook's request to demolish the black-beetles in the kitchen. These they devour with avidity and pursue them with the greatest ardour. They also eat slugs, worms, and snails; worms they seize and eat from end to end, like a Neapolitan boy with a string of maccaroni, slowly masticating, the unconsumed portion being constantly transferred from one side of the mouth to the other, so that both sides of the jaws may come into play. Dr. Dallas quaintly remarks on the process: "This must be an unpleasant operation for the worm, much as its captor may enjoy it." Toads, frogs, mice, and even snakes are eaten by the European hedgehog. It would be interesting to find out whether the Indian hedgehog also attacks snakes; even the viper in Europe is devoured by this animal, who apparently takes little heed of its bite. The European species also eats eggs when it can get them, and I have no doubt does much damage to those birds who make their nests on the ground.

Few dogs will tackle a hedgehog, for the little creature at once rolls itself into a spiny ball, all sharp prickles, by means of the contraction of

set of cutaneous muscles, the most important of which, the *orbicularis panniculi*, form a broad band encircling the body which draws together the edges of the spiny part of the skin. There is a most interesting account of the mechanism of the spines in Mr. F. Buckland's notes to White's 'Natural History of Selborne,' vol. ii., page 76. A jet of water poured on to the part within which the head is concealed will make the creature unroll, and it is said that foxes and some dogs have discovered a way of applying this plan, and also that foxes will roll a hedgehog into a ditch or pond, and thus make him either expose



Hedgehog.

himself to attack or drown. Gipsies eat hedgehogs, and consider them a delicacy—the meat being white and as tender as a chicken (not quite equal to porcupine, I should say); they cook them by rolling them in clay, and baking them till the clay is dry; when the ball is broken open the prickles come off with the crust.

Hedgehogs have had several popular fallacies concerning them. They were supposed to suck cows dry during the night and to be proof against poisons. Mr. Frank Buckland tried prussic acid on one with fatal results, but he says the bite of a viper seemed to have no effect. Pallas, I know, has remarked that hedgehogs will eat hundreds of

cantharides beetles with impunity, whereas one or two will cause extreme agony to a cat or dog. The female goes with young about seven weeks, and she has from three to eight in number. The little ones when born have soft spines—which, however, soon harden—are blind, and, with the exception of the rudimentary prickles, quite naked. They are white at birth, but in about a month acquire the colour of the mother.

No. 150. ERINACEUS COLLARIS.

The Collared Hedgehog (*Jerdon's No.* 85).

HABITAT.—Northern India and Afghanistan. Dallas says from Madras to Candahar; but Jerdon calls it the North Indian hedgehog, and assigns to it the North-west, Punjab, and Sind, giving Southern India to the next species.

DESCRIPTION.—Spines irregularly interwoven, ringed with white and black, with yellowish tips, or simply white and black, or black with a white ring in the middle; ears large; chin white; belly and legs pale brown.

SIZE.—Head and body, 8 to 9 inches; tail, $\frac{7}{12}$ inch.

I have found this species in the Punjab near Lahore. One evening, whilst walking in the dusk, a small animal, which I took to be a rat, ran suddenly between my legs. Now I confess to an antipathy to rats, and, though I would not willingly hurt any animal, I could not resist an impulsive kick, which sent my supposed rat high in the air. I felt a qualm of conscience immediately afterwards, and ran to pick up my victim, and was sorry to find I had perpetrated such an assault on an unoffending little hedgehog, which was however only stunned, and was carried off by me to the Zoological Gardens. Captain Hutton writes of them that they feed on beetles, lizards, and snails; "when touched they have the habit of suddenly jerking up the back with some force so as to prick the fingers or mouth of the assailant, and at the same time emitting a blowing sound, not unlike the noise produced when blowing upon a flame with a pair of bellows." He also says they are very tenacious of life, bearing long abstinence with apparent ease; when alarmed they roll themselves up into a ball like the European species.

Hutton also remarks that *E. collaris*, on hearing a noise, jerks the skin and quills of its neck completely over its head, leaving only the tip of the nose free.

No. 151. ERINACEUS MICROPUS.

The Small-footed Hedgehog (*Jerdon's No.* 86).

HABITAT.—South India.

DESCRIPTION.—"Ears moderately large; form somewhat elongated;

very short, concealed; feet and limbs very small; head and ears nude, sooty-coloured; belly very thinly clad with yellowish hairs; spines ringed dark brown and whitish, or whitish with a broad brown subterminal ring, tipped white."—*Jerdon.*

SIZE.—Head and body about 6 inches. Dr. Anderson considers this as identical with *E. collaris.*

No. 152. ERINACEUS PICTUS.

The Painted Hedgehog.

HABITAT.—Central India, Goona, Ulwar, Agra, Kurrachee.

DESCRIPTION.—Similar to the above, but the tips of the spines are more broadly white, and the brown bands below not so dark; the ears are somewhat larger than *micropus*, and the feet narrower and not so long.

No. 153. ERINACEUS GRAYI.

HABITAT.—North-west India.

DESCRIPTION.—The general colour is blackish-brown; the spines are narrowly tipped with black, succeeded by a narrowish yellow band; then a blackish-brown band, the rest of the spine being yellowish; the broad dark-brown band is so strongly developed as to give the animal its dark appearance when viewed from the side; some animals are, however, lighter than others. The feet are large; the fore-feet broad, somewhat truncated, with moderately long toes and powerful claws.

SIZE.—Head and body about $6\frac{3}{4}$ inches.

No. 154. ERINACEUS BLANFORDI (*Anderson*).

HABITAT.—Sind, where one specimen was obtained by Mr. W. T. Blanford, at Rohri.

DESCRIPTION.—Muzzle rather short, not much pointed; ears moderately large, but broader than long, and rounded at the tips; feet larger and broader than in the next species, with the first toe more largely developed than in the last. The spines meet in a point on the forehead, and there is no bare patch on the vertex. Each spine is broadly tipped with deep black, succeeded by a very broad yellow band, followed by a dusky brown base; fur deep brown; a few white hairs on chin and anterior angle of ear.

SIZE.—Head and body, 5·36 inches.

No. 155. ERINACEUS JERDONI (*Anderson*).

HABITAT.—Sind, Punjab frontier.

DESCRIPTION.—Muzzle moderately long and pointed; ears large

and at tip and broad at base; feet large, especially the fore-feet; claws strong. The spines begin on a line with the anterior margins of the ears; large nude area on the vertex; spines with two white and three black bands, beginning with a black band. When they are laid flat the animal looks black; but on erection the white shows and gives a variegated appearance.

SIZE.—Head and body about 7½ inches.

No. 156. ERINACEUS MEGALOTIS.

The Large-eared Hedgehog.

HABITAT.—Afghanistan.

More information is required about this species. Jerdon seems to think it may be the same as described by Pallas (*E. auritus*), which description I have before me now ('Zoographica Rosso Asiatica,' vol. i. page 138), but I am unable to say from comparison that the two are identical—the ears and the muzzle are longer than in the common hedgehog. This is the species which he noticed devouring blistering beetles with impunity. It has a very delicate fur of long silky white hairs, covering the head, breast and abdomen, "forming also along the sides a beautiful ornamental border" (*Horsfield*, from a specimen brought from Mesopotamia by Commander Jones, I.N.)

The space to which I am obliged to limit myself will not allow of my describing at greater length; but to those of my readers who are interested in the Indian hedgehogs, I recommend the paper by Dr. J. Anderson in the 'Journal of the Asiatic Society of Bengal' for 1878, page 195, with excellently drawn plates of the heads, skulls and feet of the various species. There is one peculiarity which he notices regarding the skull of *E. collaris* (or, as he calls it, *micropus*): the zygomatic arch is not continuous as in the other species, but is broken in the middle, the gap being caused by the absence of the *malar* or cheek-bone. In this respect it resembles, though Dr. Anderson does not notice it, the *Centetidæ* or *Tanrecs* of Madagascar.

Dr. Anderson's classification is very simple and good. He has two groups: the first, containing *E. micropus* and *E. pictus*, is distinguished by the *second upper premolar simple, one-fanged, the feet club-shaped; soles tubercular.* The second group, containing *E. Grayi*, *E. Blanfordi* and *E. Jerdoni*, has *the second upper premolar compound, three-fanged, and the feet well developed and broad.* The first group has also a division or bare area on the vertex; the second has not.

FAMILY HYLOMIDÆ (*Anderson*).

The following little animal has affinities to both *Erinaceidæ* and *Tupaiidæ*, and therefore it may appropriately be placed here. Dr. Anderson on the above ground has placed it in a separate family, otherwise it is generally classed with the *Erinaceidæ*. Its skull has the general form of the skull of *Tupaia*, but in its imperfect orbit, in the rudiment of a post-orbital process, and in the absence of any imperfections of the zygomatic arch and in the position of the lachrymal foramen it resembles the skull of *Erinaceus*. The teeth are 44 in number: Inc., $\frac{3-3}{3-3}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{4-4}{4-4}$; molars, $\frac{3-3}{3-3}$, and partake of the character of both *Tupaia* and *Erinaceus*. The shank-bones being united and the rudimentary tail create an affinity to the latter, whilst its arboreal habits are those of the former.

GENUS HYLOMYS.

Head elongate; ears round; feet arboreal, naked below; tail seminude; pelage not spiny.

No. 157. HYLOMYS PEGUENSIS.

The Short-tailed Tree-Shrew.

HABITAT.—Burmah, Pegu, Ponsee in the Kakhyen hills.
Appears to be identical with the species from Borneo (*H. suillus*).

FAMILY TUPAIIDÆ.

These interesting little animals were first accurately described about the year 1820, though, as I have before stated, it was noticed in the papers connected with Captain Cook's voyages, but was then supposed to be a squirrel. Sir T. Stamford Raffles writes: "This singular little animal was first observed tame in the house of a gentleman at Penang, and afterwards found wild at Singapore in the woods near Bencoolen, where it lives on the fruit of the kayogadis, &c." Another species, *T. Javanica*, had, however, been discovered in Java fourteen years before, but not published till 1821. They are sprightly little creatures,

easily tamed, and, not being purely insectivorous, are not difficult to feed in captivity. Sir T. S. Raffles describes one that roamed freely all over the house, presenting himself regularly at meal-times for milk and fruit. Dr. Sal. Müller describes the other species (*T. Javanica*) as a confiding, simple little animal, always in motion, seeking its food at one time amongst dry leaves and moss on the ground, and again on the stems and branches of trees, poking its nose into every crevice. Its nest, he says, is formed of moss at some height from the ground, supported on clusters of orchideous plants. Dr. Cantor, in his 'Catalogue of the Mammalia of the Malayan Peninsula,' writes as follows: "In a state of nature it lives singly or in pairs, fiercely attacking intruders of its own species. When several are confined together they fight each other, or jointly attack and destroy the weakest. The natural food is mixed insectivorous and frugivorous. In confinement, individuals may be fed exclusively on either, though preference is evinced for insects; and eggs, fish and earth-worms are equally relished. A short, peculiar, tremulous, whistling sound, often heard by calls and answers in the Malayan jungle, marks their pleasurable emotions, as for instance on the appearance of food, while the contrary is expressed by shrill protracted cries. Their disposition is very restless, and their great agility enables them to perform the most extraordinary bounds in all directions, in which exercise they spend the day, till night sends them to sleep in their rudely-constructed lairs in the highest branches of trees. At times they will sit on their haunches, holding their food between their forelegs, and after feeding they smooth the head and face with both fore-paws, and lick the lips and palms. They are also fond of water, both to drink and to bathe in. The female usually produces one young."

The above description reminds one forcibly of the habits of squirrels, so it is no wonder that at one time these little creatures were confounded with the *Sciuridæ*.

GENUS TUPAIA.

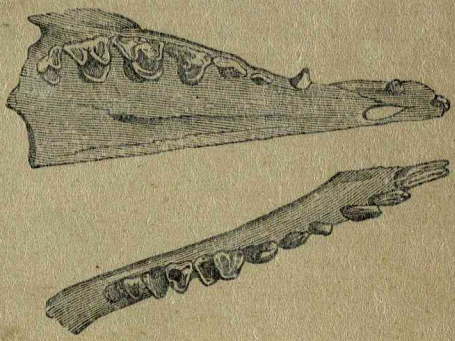
The dentition of this genus is as follows: Either four or six incisors in the upper jaw, but always six in the lower; four premolars and three molars in each jaw, upper and lower. The skull has a complete bony orbit, and the zygomatic arch is also complete, but with a small elongated perforation; the muzzle attenuated, except in *T. Ellioti*; ears oval; the stomach possesses a cæcum or blind gut; the eyes are large and prominent, and the tail bushy, like that of a squirrel; the toes are five in number, with strong claws; the shank-bones are not united as in the hedgehogs. The diet is mixed insectivorous and frugivorous.

No. 158. TUPAIA ELLIOTI.

Elliot's Tree-Shrew (Jerdon's No. 87).

HABITAT. — Southern India, Godavery district, Cuttack; the Central Provinces, Bhagulpore range.

DESCRIPTION.—Fur pale rufous brown, darker on the back and paler on the sides; the chin, throat, breast and belly yellowish, also a streak of the same under the tail; the upper surface of the tail is of the same colour as the centre of the back; there is a pale line from the muzzle over the eye, and a similar patch beneath it; the fur of this species is shorter and more harsh, and the head is more blunt than in the Malayan members of the family.



Dentition of *Tupaia*.

SIZE.—Head and body, 7 to 8 inches; tail, 7 to 9 inches.

No. 159. TUPAIA PEGUANA. *Syn.*—TUPAIA BELANGERI.

The Pegu Tree-Shrew (Jerdon's No. 88).

HABITAT.—Sikim (Darjeeling), Assam and through Arakan to Tenasserim.

DESCRIPTION.—Jerdon says: "General hue a dusky greenish-brown, the hairs being ringed brown and yellow; lower parts the same, but lighter, and with a pale buff line; a stripe from the throat to the vent, broadest between the forearms and then narrowing; ears livid red, with a few short hairs; palms and soles dark livid red." Dr. Anderson remarks that the fur is of two kinds of hairs—one fine and wavy at the extremity, banded with black, yellow and black; the second being strong and somewhat bristly, longer than the other, and banded with a black basal half and then followed by rings of yellow and black, then yellow again with a black tip, the black basal half of the hairs being hidden, the annulation of the free portions produces a rufous olive-grey tint over the body and tail.

SIZE.—Head and body about 7 inches; tail, 6½.

Jerdon says of it that those he procured at Darjeeling frequented the zone from 3000 to 6000 feet; they were said by the natives to kill small

birds, mice, &c. The Lepcha name he gives is *Kalli-tang-zhing*. McMaster in his notes writes: "The Burmese Tupaia is a harmless little animal; in the dry season living in trees and in the monsoon freely entering our houses, and in impudent familiarity taking the place held in India by the common palm squirrel. It is, however, probably from its rat-like head and thievish expression, very unpopular. I have found them in rat-traps, however, so possibly they deserve to be so." He adds he cannot endorse the statement regarding their extraordinary agility mentioned by Dr. Cantor and quoted by Jerdon, for he had seen his

Tupaia Peguana.

terriers catch them, which they were never able to do with squirrels; and cats often seize them.

Mason says: "One that made his home in the mango-tree near my house at Tonghoo made himself nearly as familiar as the cat. Sometimes I had to drive him off the bed, and he was very fond of putting his nose into the teacups immediately after breakfast, and acquired a taste both for tea and coffee. He lost his life at last by incontinently walking into a rat-trap."

The Burmese name for it is *Tswai* in Arracan. Jerdon states that it

is one of the few novelties that had escaped the notice of Mr. Brian Hodgson, but Dr. Anderson mentions a specimen (unnamed) from Nepal in the British Museum which was obtained by Hodgson.

No. 160. TUPAIA CHINENSIS (*Anderson*).

HABITAT.—Burmah, Kakhyen hills, east of the valley of the Irrawaddy.

DESCRIPTION.—Ferruginous above, yellowish below, the basal two-thirds of the hair being blackish, succeeded by a yellow, a black, and then a yellow and black band, which is terminal; there is a faint shoulder streak washed with yellowish; the chest pale orange yellow, which hue extends along the middle of the belly as a narrow line; under surfaces of limbs grizzled as on the back, but paler; upper surface of tail concolorous with the dorsum.

SIZE.—Head and body, 6½ inches; tail, 6·16.

The teeth are larger than those of *T. Ellioti*, but smaller than the Malayan *T. ferruginea*, and the skull is smaller than that of the last species, and the teeth are also smaller. Dr. Anderson says: "When I first observed the animal it was on a grassy clearing close to patches of fruit, and was so comporting itself that in the distance I mistook it for a squirrel. The next time I noticed it was in hedgerows."

The other varieties of *Tupaia* belong to the Malayan Archipelago—*T. ferruginea*, *T. tana*, *T. splendidula*, and *T. javanica* to Borneo and Java. There is one species which inhabits the Nicobars.

No. 161. TUPAIA NICOBARICA.

HABITAT.—Nicobar Island.

DESCRIPTION.—Front and sides of the face, outside of fore-limbs, throat and chest, golden yellow; inner side of hind limbs rich red brown, which is also the colour of the hind legs and feet; head dark brown, with golden hairs intermixed; back dark maroon, almost black; upper surface of the tail the same; pale oval patch between shoulders, dark band on each side between it and fore-limbs, passing forward over the ears.

SIZE.—Head and body, 7·10; tail, 8 inches.

There is a little animal allied to the genus *Tupaia*, which has hitherto been found only in Borneo and Sumatra, but as Sumatran types have been found in Tenasserim, perhaps some day the *Ptilocercus Lowii* may be discovered there. It has a rather shorter head than the true Banxrings, more like *T. Ellioti*, but its dentition is nearly the same, as also are its habits. Its chief peculiarity lies in its tail, which is long, slender and naked, like that of a rat for two-thirds of its length, the terminal third being adorned with a broad fringe of hair on each side,

like the wings of an arrow or the plumes of a feather. There is an excellent coloured picture of it in the 'Proc. Zool. Society,' vol. of Plates.

I had almost concluded my sketch of the Insectivora without alluding to one most interesting genus, which ought properly to have come between the shrews and the hedgehogs, the *Gymnura*, which, though common in the Malay countries, has only recently been found in Burmah—a fact of which I was not aware till I saw it included in a paper on Tenasserim mammals by Mr. W. T. Blanford ('Jour. As. Soc. Beng.,' 1878, page 150.) Before I refer to his notes I may state that this animal is a sort of link between the *Soricidæ* and the *Erinaceidæ*, and De Blainville proposed for it the generic name of *Echinosorex*, but the one generally adopted is *Gymnura*, which was the specific name given to it by its discoverer, Sir Stamford Raffles, who described it as a *Viverra* (*V. gymnura*); however, Horsfield and Vigors and Lesson, the two former in England and the latter in France, saw that it was not a civet, and, taking the naked tail as a peculiarity, they called the genus *Gymnura*, and the specimen *Rafflesii*. There is not much on record regarding the anatomy of the animal, and in what respects it internally resembles the hedgehogs. Outwardly it has the general soricine form, though much larger than the largest shrew. The long tail too is against its resemblance to the hedgehogs, which rests principally on its spiny pelage.

The teeth in some degree resemble *Erinaceus*, the molars and premolars especially, but the number in all is greater, there being forty-four, or eight more. It would be interesting to know whether the zygomatic arch is perfect and the tibia and fibula united, as in the hedgehogs, or wanting and distinct as in the shrews. I have given a slight sketch in outline of the animal.

No. 162. GYMNURA RAFFLESII.

The Bulau.

HABITAT.—Tenasserim (Sumatra, Borneo); Malacca.

DESCRIPTION.—Long tapering head, with elongated muzzle, short legs, shrew-like body, with a long, round, tapering and scaly rat-like tail, naked, with the exception of a few stiff hairs here and there among the scales. In each jaw on each side three incisors, one canine (those in the upper jaw double-fanged) and seven premolars and molars; feet five-toed, plantigrade, armed with strong claws. Fur of two kinds, fine and soft, with longer and more spiny ones intermixed. The colour varies a good deal, the general tint being greyish-black, with head and neck pale or whitish, and with a broad black patch over the eye. Some

have been found almost wholly white, with the black eye-streak and only a portion of the longer hairs black, so that much stress cannot be laid on the colouring; the tail is blackish at the base, whitish and compressed at the tip. Mr. Blanford says: "The small scales covering the tail are indistinctly arranged in rings and sub-imbricate; on the lower surface the scales are convex and distinctly imbricate, the bristles arising from the interstices. Thus the under surface of the tail is very rough, and may probably be of use to the animal in climbing." He also refers to the fact that the claws of his specimen are not retractile, and mentions that in the original description both in Latin and English the retractability of the claws is pointed out as a distinction between *Gymnura* and *Tupaia*. In the description given of the Sumatran animal both by Dallas and Cuvier nothing is mentioned about this feature.

Gymnura Rafflesii.

SIZE.—A Sumatran specimen: head and body, 14 inches; tail, 12 inches. Mr. Blanford's specimen: head and body, 12 inches; tail, 8·5.

Mr. Blanford was informed by Mr. Davison, who obtained it in Burmah, that the *Gymnura* is purely nocturnal in its habits, and lives under the roots of trees. It has a peculiar and most offensive smell, resembling decomposed cooked vegetables. The Bulau has not the power of rolling itself up like the hedgehog, nor have the similar forms of insectivores which resemble the hedgehog in some respects, such as the Tenrecs (*Centetes*), Tendracs (*Ericulus*), and Sokinahs (*Echinops*) of Madagascar.

CARNIVORA.

Speaking generally, the whole range of mammals between the *Quadrumana* and the *Rodentia* are *carnivorous* with few exceptions, yet there is one family which, from its muscular development and dentition, is pre-eminently flesh-eating, as Cuvier aptly remarks, "the sanguinary appetite is combined with the force necessary for its gratification." Their forms are agile and muscular; their circulation and respiration rapid. As Professor Kitchen Parker graphically writes: "This group, which comprises all the great beasts of prey, is one of the most compact as well as the most interesting among the mammalia. So many of the animals contained in it have become 'familiar in our mouths as house-

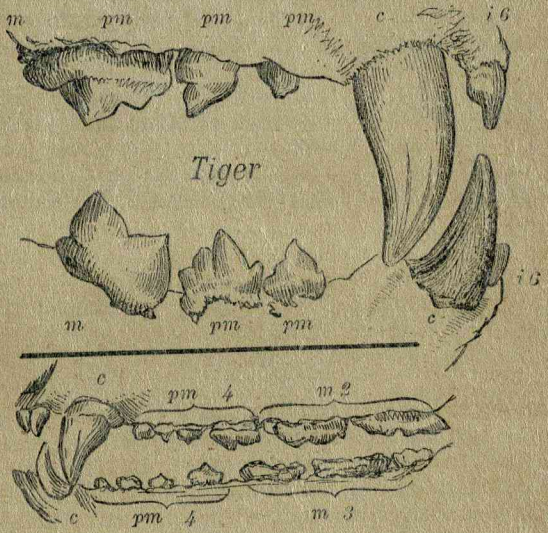
hold words,' bearing as they do an important part in fable, in travel, and even in history; so many of them are of such wonderful beauty, so many of such terrible ferocity, that no one can fail to be interested in them, even apart from the fact likely to influence us more in their favour than any other, that the two home pets, which of all others are the commonest and the most interesting, belong to the group. No one who has had a dog friend, no one who has watched the wonderful instance of maternal love afforded by a cat with her kittens, no one who loves riding across country after a fox, no lady with a taste for handsome furs, no boy who has read of lion and tiger hunts and has longed to emulate the doughty deeds of the hunter, can fail to be interested in an assemblage which furnishes animals at once so useful, so beautiful and so destructive. It must not be supposed from the name of this group that all its members are exclusively flesh-eaters, and indeed it will be hardly necessary to warn the reader against falling into this mistake, as there are few people who have never given a dog a biscuit, or a bear a bun. Still both the dog and several kinds of bears prefer flesh-meat when they can get it, but there are some bears which live almost exclusively on fruit, and are, therefore, in strictness not carnivorous at all. The name must, however, be taken as a sort of general title for a certain set of animals which have certain characteristics in common, and which differ from all other animals in particular ways." I would I had more space at my disposal for further quotations from Professor Parker's 'General Remarks on the Land Carnivora,' his style is so graphic.

The dentition of the Carnivora varies according to the exclusiveness of their fleshy diet, and the nature of that diet.

In taking two typical forms I give below sketches from skulls in my possession of the tiger, and the common Indian black bear; the one has trenchant cutting teeth which work up and down, the edges sliding past each other just like a pair of scissors; the other has flat crowned molars adapted for triturating the roots and herbage on which it feeds. A skull of an old bear which I have has molars of which the crowns are worn almost smooth from attrition. In the most carnivorous forms the tubercular molars are almost rudimentary.

The skull exhibits peculiar features for the attachment of the necessary powerful muscles. The bones of the face are short in comparison with the *cranial* portion of the skull (the reverse of the *Herbivores*); the strongly built zygomatic arch, the roughened ridges and the broad ascending ramus of the lower jaw, all afford place for the attachment of the immense muscular development. Then the hinge of the jaw is peculiar; it allows of no lateral motion, as in the ruminants; the *condyle*, or hinge-bolt of a tiger's jaw (taken from the largest in my collection), measures two inches, and as this fits accurately into its corresponding

(glenoid) cavity, there can be no side motion, but a vertical chopping one only. The skeleton of a typical carnivore is the perfection of strength and suppleness. The tissue of the bones is dense and white; the head small and beatifully articulated; the spine flexible yet strong. In those which show the greatest activity, such as the cats, civets and dogs, the spinous processes, especially in the lumbar region, are greatly developed—more so than in the bears. These serve for the attachment of the powerful muscles of the neck and back. The clavicle or collar-bone is wanting, or but rudimentary. The



stomach is simple; the intestinal canal short; liver lobed; organs of sight, hearing, and smell much developed.

Now we come to the divisions into which this group has been separated by naturalists. I shall not attempt to describe the various systems, but take the one which appears to me the simplest and best to fit in with Cuvier's general arrangement, which I have followed. Modern zoologists have divided the family into two great groups—the *Fissipedia* (split-feet) or land Carnivora, and the *Pinnipedia* (fin-feet or water Carnivora. Of the land Carnivora some naturalists have made the following three groups on the characteristics of the feet, *viz.*, *Plantigrada*, *Sub-plantigrada* and *Digitigrada*. The dogs and cats, it is well known, walk on their toes—they are the *Digitigrada;* the bears and allied forms on the palms of their hands and soles of their feet,

more or less, and thus form the other two divisions, but there is another classification which recommends itself by its simplicity and accuracy. Broadly speaking, there are three types of land carnivores—the cat, the dog, and the bear, which have been scientifically named *Æluroïdea* (from the Greek *ailouros*, a cat); *Cynoidea* (from *kuon*, a dog); and *Arctoidea* (from *arctos*, a bear). The distinction is greater between the families of *Digitigrades*, the cat and dog, than between the *Plantigrades* and *Sub-plantigrades*, and therefore I propose to adopt the following arrangement:—

I. ARCTOIDEA	*Pantigrades.*
	Sub-plantigrades.
II. ÆLUROIDEA	*Digitigrade.*
III. CYNOIDEA	

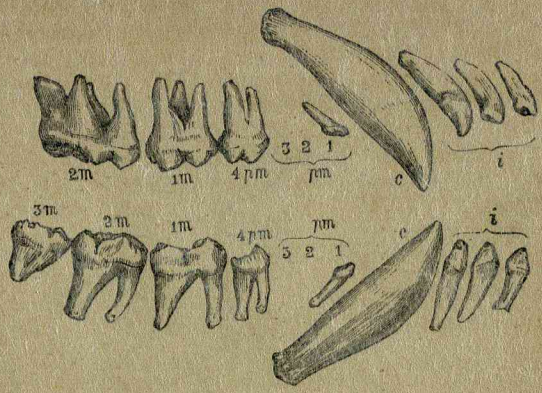
I may here remark that the Insectivora are in most cases plantigrade, therefore the term is not an apposite one as applied to the bear and bear-like animals only, but in treating of them under the term *Arctoidea* we may divide them again into *Plantigrades* and *Sub-plantigrades.*

ARCTOIDEA.

PLANTIGRADA.

URSIDÆ.

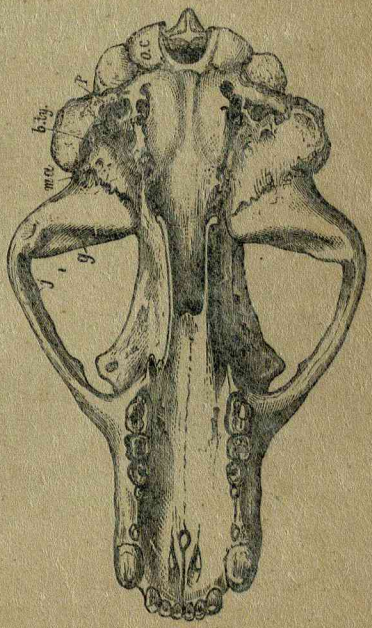
The bears differ from the dogs and cats widely in form and manner, and diet. The cat has a light springy action, treading on the tips of its toes, a well-knit body glistening in a silky coat, often richly variegated, "a clean cut," rounded face, with beautifully chiselled nostrils and thin lips, and lives exclusively on flesh. The bear shambles along with an awkward gait, placing the entire sole of his foot on the ground; he has rough dingy fur, a snout like a pig's, and is chiefly a vegetarian—and in respect to this last peculiarity his dentition is modified considerably: the incisors are large, tri-cuspidate; the canines somewhat smaller than in the restricted carnivora; these are followed by three small teeth, which usually fall out at an early period, then comes a permanent premolar of considerable size, succeeded by two molars in the upper, and three in the under jaw. The dental formula is therefore: Inc., $\frac{3-3}{3-3}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{4-4}{4-4}$; molars, $\frac{2-2}{3-3}$. In actual numbers this formula agrees with that for the dogs; but the form of the teeth is very different, inasmuch as the large premolars and the molars have flat tuberculated crowns, constituting them true grinders, instead of the



Dentition of Bear.

trenchant shape of the cats, which is also, to a modified extent, possessed by the dogs, of which the last two molars have, instead of cutting edges, a grinding surface with four cusps. The trenchant character is entirely lost in the bear, even in the carnivorous species which exhibit no material difference in the teeth, any more than, as I mentioned at the commencement of this work, do the teeth of the human race, be they as carnivorous as the Esquimaux, or vegetarian as the Hindu.

There is also another peculiarity in the bear's skull as compared with the cat's. In the latter there is a considerable bulging below the aperture of the ear called the *bulla tympani*, or bulb of the drum. This is almost wanting in the bear, and it would be interesting to know whether this much affects its hearing. I myself am of opinion that bears are not acute in this sense, but then my experience has been with the common Indian *Ursus*,



Skull of Bear (under view).

Ursus Isabellinus.

r *Melursus labiatus* only, and the skulls of this species in my possession strongly exhibit this peculiarity.* The cylindrical bones resemble those of man nearer than any other animal, the *femur* especially; and a skinned bear has a most absurd resemblance to a robust human being. The sole of the hind foot leaves a mark not unlike that of a human print.

The Brown Bear of Europe (*Ursus arctos*) is the type of the family, and has been known from the earliest ages—I may say safely prehistoric ages, for its bones have been frequently found in post-pliocene formations along with those of other animals of which some are extinct. An extinct species of bear, *Ursus spelæus*, commonly called the Cave Bear, seems to have been the ancestor of the Brown Bear which still is found in various parts of Europe, and is said to have been found within historic times in Great Britain.

The bear of which we have the oldest record is almost the same as our Indian Brown or Snow Bear. Our bear (*U. Isabellinus*) is but a variety of *U. Syriacus*, which was the one slain by David, and is spoken of in various parts of the Bible. It is the nearest approach we have to the European *U. arctos*.

No. 163. URSUS ISABELLINUS.

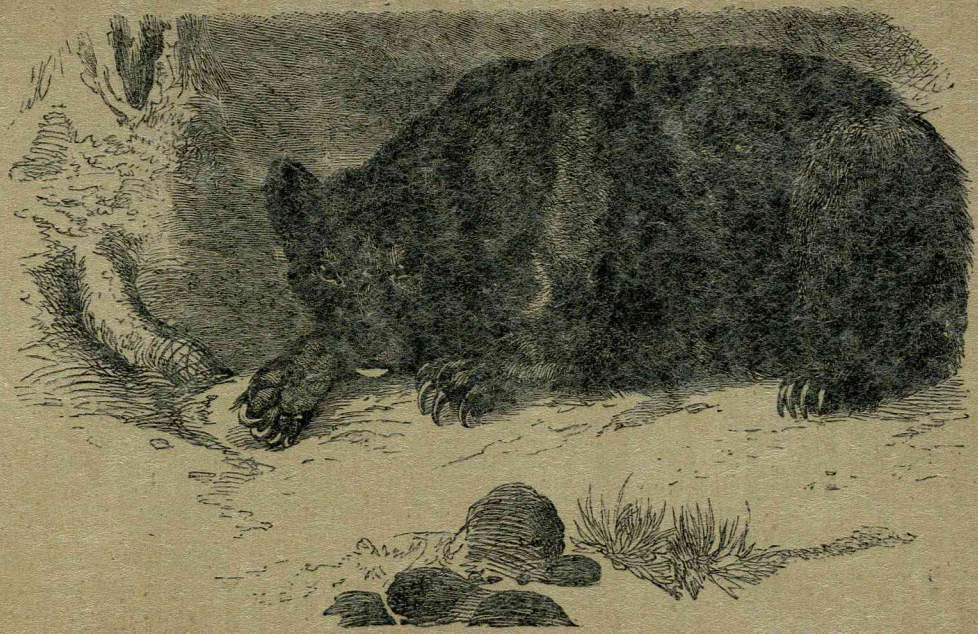
The Himalayan Brown Bear (*Jerdon's No.* 89).

NATIVE NAME.—*Barf-ka-rich* or *Bhalu*, Hind.; *Harput*, Kashmiri; *Drin-mor*, Ladakhi.

DESCRIPTION.—A yellowish-brown colour, varying somewhat according to sex and time of year. Jerdon says: "In winter and spring the fur is long and shaggy, in some inclining to silvery grey, in others to reddish brown; the hair is thinner and darker in summer as the season advances, and in autumn the under fur has mostly disappeared, and a white collar on the chest is then very apparent. The cubs show this collar distinctly. The females are said to be lighter in colour than the males."

Gray does not agree in the theory that *Ursus Syriacus* is the same as this species; in external appearance he says it is the same, but there are differences in the skull; the nose is broader, and the depression in the forehead less. The zygomatic arch is wider and stronger; the lower jaw stronger and higher, and the upper tubercular grinders shorter and thicker than in *Ursus Isabellinus*.

* On referring to Mr. Sanderson's interesting book, 'Thirteen Years among the Wild Beasts of India,' and General Shakespear's 'Wild Sports,' I find that both those authors corroborate my assertion that the sloth bear is deficient in the sense of hearing. Captain Baldwin, however, thinks otherwise; but the evidence seems to be against him in this respect.



Ursus Tibetanus.

"It is found," Jerdon says, "only on the Himalayas and at great elevations in summer close to the snow. In autumn they descend lower, coming into the forests to feed on various fruits, seeds, acorns, hips of rose-bushes, &c., and often coming close to villages to plunder apples, walnuts, apricots, buckwheat, &c. Their usual food in spring and summer is grass and roots. They also feed on various insects, and are seen turning over stones to look for scorpions (it is said) and insects that harbour in such places. In winter they retreat to caves, remaining in a state of semi-torpidity, issuing forth in March and April. Occasionally they are said to kill sheep or goats, often wantonly, apparently, as they do not feed upon them. They litter in April and May, the female having generally two cubs. This bear does not climb trees well."

The next three species belong to the group of Sun Bears; *Helarctos* of some authors.

No. 164. URSUS (HELARCTOS) TORQUATUS *vel* TIBETANUS.

The Himalayan Black Bear (Jerdon's No. 90).

NATIVE NAME.—*Bhalu*, Hind.; *Thom*, Bhot.; *Sona*, Lepcha.

HABITAT.—The Himalayas, Nepal, Assam, Eastern Siberia, and China.

DESCRIPTION.—Entirely black, with the exception of a broad white V-shaped mark on the chest and a white chin. Neck thick, head flattened; ears large; claws very long and curved; fur short; body and head more slender than the preceding species.

Jerdon remarks that the specific name of this bear is unfortunate, since it is rare in Thibet. However the more appropriate specific name *torquatus* is now more generally adopted. It seems to be common in all the Himalayan ranges, where it is to be found from 5000 to 12,000 feet. Jerdon says it lives chiefly on fruit and roots, apricots, walnuts, apples, currants, &c., and also on various grains, barley, Indian corn, buckwheat, &c., and in winter on acorns, climbing the oak trees and breaking down the branches. They are not afraid of venturing near villages, and destroy not only garden stuff, but—being, like all bears, fond of honey—pull down the hives attached to the cottages of the hill people. "Now and then they will kill sheep, goats, &c., and are said occasionally to eat flesh. This bear has bad eyesight, but great power of smell, and if approached from windward is sure to take alarm. A wounded bear will sometimes show fight, but in general it tries to escape. It is said sometimes to coil itself into the form of a ball, and thus roll down steep hills if frightened or wounded." If cornered it attacks savagely, as all bears will, and the face generally suffers, according to Jerdon; but I have noticed this with the common Indian Sloth Bear, several of the men

wounded in my district had their scalps torn. He says: "It has been noticed that if caught in a noose or snare, if they cannot break it by force they never have the intelligence to bite the rope in two, but remain till they die or are killed." In captivity this bear, if taken young, is very quiet, but is not so docile as the Malayan species.*

* Since writing the above, the following letter appeared in *The Asian* of May 11, 1880:—

"THE HIMALAYAN BLACK BEAR.

"SIR,—Mr. Sterndale, in the course of his interesting papers on the Mammalia of British India, remarks of *Ursus Tibetanus*, commonly known as the Himalayan Black Bear, that 'a wounded one will sometimes show fight, but in general it tries to escape.' This description is not, I think, quite correct. As it would lead one to suppose that this bear is not more savage than any other wild animal—the nature of most of the *feræ* being to try to escape when wounded, *unless* they see the hunter who has fired at them, when many will charge at once, and desperately. The Himalayan Black Bear will not only do this *almost invariably*; but often attacks men without any provocation whatever, and is altogether about the most fierce, vicious, dangerous brute to be met with either in the hills or plains of India. They inflict the most horrible wounds, chiefly with their paws, and generally—as Mr. Sterndale states—on the face and head. I have repeatedly met natives in the interior frightfully mutilated by encounters with the Black Bear, and cases in which Europeans have been killed by them are by no means uncommon. These brutes are totally different in their dispositions to the Brown Bear (*Ursus Isabellinus*), which, however desperately wounded, will never charge. I believe there is no case on record of a hunter being charged by a Brown Bear; or even of natives, under any circumstances, being attacked by one; whereas every one of your readers who has ever marched in the Himalayas must have come across many victims of the ferocity of *Ursus Tibetanus*. As I said before, this brute often, unwounded, attacks man without any provocation whatever. Two cases that I know of myself may not be without interest. An officer shooting near my camp was stalking some thar. He was getting close to them, when a Black Bear rushed out at him from behind a large rock on his right and above him. He was so intent on the thar, and the brute's rush was so sudden, that he had barely time to pull from the hip, but he was fortunate enough to kill the animal almost at his feet. I heard this from him on the morning after it happened. On another occasion, I was shooting in Chumba with a friend. One evening he encamped at a village, about which there was, as usual, a little cultivation on terraces, and a good many apricot-trees. Lower down the khud there was dense jungle. The villagers told us that a Black Bear had lately been regularly visiting these trees, and generally came out about dusk, so that if we would go down and wait, we should be pretty sure of a shot. We went, and took up positions behind trees, about 200 yards apart, each of us having a man from the village with us. Intervening jungle prevented us from seeing each other. I had not been at my post more than ten minutes when I was startled by loud shrieks and cries from the direction of my companion. No shot was fired, and the coolie with me said that the bear had killed some one. In less than a minute I had reached the spot where I had left my friend. He, and the man with him, had disappeared; but, guided by the shrieks, which still continued, I made my way into the thick cover in front of his post, and about fifty yards inside it, much to my relief, came upon him, rifle in hand, standing over the dead body of a man, over which two people—the coolie that had been with my friend and an old woman—were weeping, and shrieking loudly. 'Look out!' said he, as I came up, 'the bear has just killed this fellow!' The first thing to be done was to carry him out into the open. I helped to do this, and directly I touched him I felt that he was stone cold, and a further examination showed he must have been dead some hours. That he had

In *The Asian* of January 7th, 1879, page 68, a correspondent ("N. F. T. T.") writes that he obtained a specimen of this bear which was coal black throughout, with the exception of a dark dirty yellow on the lower lip, but of the usual crescentic white mark she had not a trace. This exceptional specimen was shot in Kumaon. Robinson, in his 'Account of Assam,' states that these bears are numerous there, and in some places accidents caused by them are not unfrequent.

All the Sun Bears are distinguished for their eccentric antics, conspicuous among which is the gift of walking about on their hind legs in a singularly human fashion. Those in the London Zoological Gardens invariably attract a crowd. They struggle together in a playful way, standing on their hind legs to wrestle. They fall and roll, and bite and hug most absurdly.

Captain J. H. Baldwin, in his 'Large and Small Game of Bengal,' puts this bear down as not only carnivorous, but a foul feeder. He says: On my first visit to the hills I very soon learnt that this bear was a flesh-eater, so far as regards a sheep, goats, &c., but I could hardly believe that he would make a repast on such abominations (i.e. carrion), though the paharies repeatedly informed me that such was the case. One day, however, I saw a bear busy making a meal off a bullock that had died of disease, and had been thrown into the bed of a stream." In another page Captain Baldwin states that the Himalayan Bear is a good swimmer; he noticed one crossing the River Pindur in the flood, when, as he remarks, "no human being, however strong a swimmer, could have stemmed such a roaring rapid."

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been killed by a bear was also very evident. He was naked to the waist, and had been cutting grass. His bundle lay by him, and the long curved kind of sickle that the hillmen used to cut grass with was stuck in his girdle, showing that he had not had time to draw it to strike one blow in his defence. The mark of the bear's paw on his left side was quite distinct. This had felled him to the ground, and then the savage brute had given him one bite—no more, but that one had demolished almost the whole of the back of his head, and death must have been instantaneous. The man had apparently cut his load of grass, and was returning with it to the village, when he disturbed the bear, which attacked him at once. The old woman was his mother, and the coolie with J—— some relation. Her son having been away all day, I suppose the old woman had gone to look for him. She found his body, as described, just below J——'s post, and at once set up a lamentation which brought the coolie, J——'s attendant, down to her, and J—— following himself, thought at first that the man had been killed then and there. There was such a row kicked up that no bear came near the apricots that night, and the next day we had to march, as our leave was up. I have heard of many other cases of the Black Bear attacking without any provocation, and from what I know of the brute I quite believe them; and, after all, the animal is not worth shooting. Their skins are always poor and mangy, and generally so *greasy* that they are very difficult to keep until you can make them over to the dresser. The skin of the Snow or Brown Bear, on the other hand, particularly if shot early in the season, is a splendid trophy, and forms a most beautiful and luxurious rug, the fur being extremely soft, and several inches in depth. "SPINDRIFT.

No. 165. URSUS (HELARCTOS) GEDROSIANUS.

Baluchistan Bear.

NATIVE NAME.—*Mamh.*

HABITAT.—Baluchistan.

DESCRIPTION.—Fur ranging from brown to brownish-black, otherwise as in last species.

This is a new species, brought to notice by Mr. W. T. Blanford, and named by him. The skull of the first specimen procured was scarcely distinguishable from that of a female of *Ursus torquatus*, and he was for a time apparently in doubt as to the distinctness of the species, taking the brown skin as merely a variety; but a subsequently received skull of an adult male seems to prove that it is a much smaller animal.

No. 166. URSUS (HELARCTOS) MALAYANUS.

The Bruang or Malayan Sun Bear.

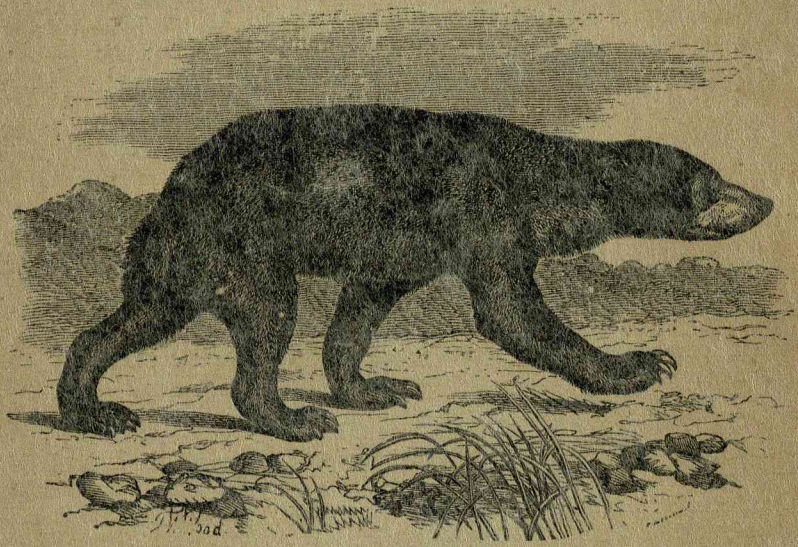
NATIVE NAME.—*Wet-woon*, Arracan.

HABITAT.—Burmah, Malay Peninsula and adjacent islands.

DESCRIPTION.—Smaller than *U. torquatus*, not exceeding four and a half feet in length. Fur black, brownish on the nose; the chest marked with a white crescent, or, in the Bornean variety, an orange-coloured heart-shaped patch; the claws are remarkably long; mouth and lower jaw dirty white; the lower part of the crescent prolonged in a narrow white streak down to the belly, where it is widened out into a large irregular spot. Marsden, in his 'History of Sumatra,' published towards the end of the last century, speaks of this bear under the name of *Bruang* (query: is our *Bruin* derived from this?), and mentions its habit of climbing the cocoa-nut trees to devour the tender part, or cabbage.

It is more tamable and docile than the Himalayan Sun Bear, and is even more eccentric in its ways. The one in the London "Zoo," when given a biscuit, lies down on its back, and passes it about from fore to hind paws, eyeing it affectionately, and making most comical noises as it rolls about. Sir Stamford Raffles writes of one which was in his possession for two years:—"He was brought up in the nursery with the children; and when admitted to my table, as was frequently the case, gave a proof of his taste by refusing to eat any fruit but mangosteens, or to drink any wine but champagne. The only time I ever knew him out of humour was on an occasion when no champagne was forthcoming. He was naturally of a playful and affectionate disposition, and it was never found necessary to chain or chastise him. It was usual for this bear, the cat, the dog, and a small blue mountain bird, or lory, of New Holland, to

mess together and eat out of the same dish. His favourite playfellow was the dog, whose teasing and worrying was always borne, and returned with the utmost good humour and playfulness. As he grew up he became a very powerful animal, and in his rambles in the garden he would lay hold of the largest plantains, the stems of which he could scarcely embrace, and tear them up by the roots." The late General A. C. McMaster gives an equally amusing account of his pet of this species which was obtained in Burmah. "Ada," he writes, "is never out of temper, and always ready to play with any one. While she was with me, 'Ada' would not eat meat in any shape; but I was told by one of the



Ursus Malayanus.

ship's officers that another of the same species, 'Ethel' (also presented by me to the Committee of the People's Park of Madras, and by them sent to England), while coming over from Burmah killed and devoured a large fowl put into her cage. I do not doubt the *killing*, for at that time 'Ethel' had not long been caught, and was a little demon in temper, but I suspect that, while attention was taken off, some knowing lascar secured the body of the chicken, and gave her credit for having swallowed it. 'Ada's' greatest delight was in getting up small trees; even when she was a chubby infant I could, by merely striking the bark, or a branch some feet above her head, cause her to scramble up almost any

free. At this time poor 'Ada,' a Burman otter, and a large white poodle were, like many human beings of different tastes or pursuits, very fast friends." In another part he mentions having heard of a bear of this species who delighted in cherry brandy, "and on one occasion, having been indulged with an entire bottle of this insinuating beverage, got so completely intoxicated that it stole a bottle of blacking, and drank off the contents under the impression that they were some more of its favourite liquor. The owner of the bear told me that he saw it suffering from this strange mixture, and evidently with, as may easily be imagined, a terrible headache."

So much for the amusing side of the picture, now for the other.

Although strictly frugivorous, still it has been known to attack and devour man in cases of the greatest want, and it also occasionally devours small animals and birds, in the pursuit of which, according to Dr. Sal Müller, it prefers those that live on a vegetable diet. The Rev. Mr. Mason, in his writings about Burmah, says "they will occasionally attack man when alone;" he instances a bear upsetting two men on a raft, and he goes on to add that "last year a Karen of my acquaintance in Tonghoo was attacked by one, overcome, and left by the bear for dead." In this case there was no attempt to devour, and it may have been, as I have often observed with the Indian Sloth Bear, that such attacks are made by females with young.

Dr. Sal Müller states: "in his native forests this bear displays much zeal and ingenuity in discovering the nests of bees, and in extracting their contents by means of his teeth from the narrow orifices of the branches of the trees in which they are concealed."

The next species constitutes the genus *Melursus* of Meyer or *Prochilus* of Illiger. It is an awkward-shaped beast, from which it probably derives its name of "Sloth Bear," for it is not like the sloth in other respects. It has long shaggy hair, large curved claws (which is certainly another point of resemblance to the sloth), and a very much elongated mobile snout. Another peculiarity is in its dentition; instead of six incisors in the upper jaw it has only four.

Blyth, in his later writings, adopts Illiger's generic name *Prochilus*.

No. 167. URSUS (MELURSUS) LABIATUS.

The Common Indian Sloth Bear.

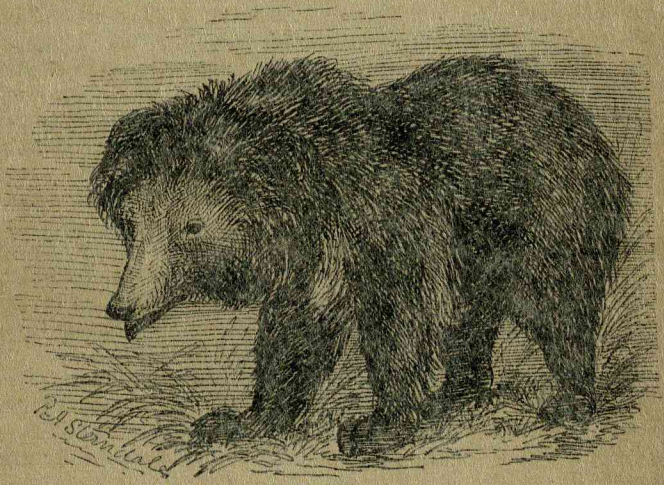
NATIVE NAMES.—*Bhalu*, Hind.; *Reench*, Hind.; *Riksha*, Sanscrit; *Aswail*, Mahr.; *Elugu*, Tel.; *Kaddi* or *Karadi*, Can.; *Yerid* or *Asol* of the Gonds; *Banna* of the Coles.

HABITAT.—All over the peninsula of India. Blyth says it is not found in Burmah.

DESCRIPTION.—General shape of the ursine type, but more than usually ungainly and awkward. Hair very long and shaggy, all black, with the exception of a white V-shaped mark on the chest, and dirty whitish muzzle and tips to its feet; snout prolonged and flexible; claws very large.

SIZE.—A large animal of this species will measure from five to six feet in length, and stand nearly three feet high, weighing from fifteen to twenty stones.

Our old friend is so well known that he hardly requires description, and the very thought of him brings back many a ludicrous and exciting scene of one's jungle days. There is frequently an element of comicality



Ursus labiatus.

in most bear-hunts, as well as a considerable spice of danger; for, though some people may pooh-pooh this, I know that a she-bear with cubs is no despicable antagonist. Otherwise the male is more anxious to get away than to provoke an attack.

This bear does not hibernate at all, but is active all the year round. In the hot weather it lies all day in cool caves, emerging only at night. In March and April, when the *mohwa*-tree is in flower, it revels in the luscious petals that fall from the trees, even ascending the branches to shake down the coveted blossoms. The *mohwa* (*Bassia latifolia*) well merits a slight digression from our subject. It is a large-sized umbrageous tree, with oblong leaves from four to eight inches long, and two to

four inches broad. The flowers are globular, cream coloured, with a faint greenish tint, waxy in appearance, succulent and extremely sweet, but to my taste extremely nasty, there being a peculiar disagreeable flavour which lingers long in the mouth. However not only do all animals, carnivorous as well as herbivorous, like them, but they are highly appreciated by the natives, who not only eat them raw, but dry them in the sun and thus keep them for future consumption, and also distil an extremely intoxicating spirit from them. The fresh refuse, or *marc*, after the extraction of the spirit is also attractive to animals. Some years ago I sent to Mr. Frank Buckland, for publication in *Land and Water*, an account of a dog which used to frequent a distillery for the purpose of indulging in this refuse, the result of which was his becoming completely intoxicated. This *marc*, after further fermentation, becomes intensely acid, and on one occasion I used it successfully in cleaning and brightening a massive steel and iron gate which I had constructed. I made a large vat, and filling it with this fermented refuse, put the gate in to pickle. The seeds of the *mohwa* yield an oil much prized by the natives, and used occasionally for adulterating *ghee*. The wood is not much used; it is not of sufficient value to compensate for the flower and fruit, consequently the tree is seldom cut down. When an old one falls the trunk and large limbs are sometimes used for sluices in tanks, for the heart wood is generally rotten and hollow, and it stands well under water. If you ask a Gond about the *mohwa* he will tell you it is his father and mother. His fleshly father and mother die and disappear, but the *mohwa* is with him for ever! A good *mohwa* crop is therefore always anxiously looked for, and the possession of trees coveted; in fact a large number of these trees is an important item for consideration in the assessment of land revenues. No wonder then that the villager looks with disfavour on the prowling bear who nightly gathers up the fallen harvest, or who shakes down the long-prayed-for crop from the laden boughs.

The Sloth Bear is also partial to mangos, sugar-cane, and the pods of the *amaltas* or *cassia* (*Cathartocarpus fistula*), and the fruit of the jack-tree (*Artocarpus integrifolia*).

It is extremely fond of honey, and never passes an ant-hill without digging up its contents, especially those of white ants. About twenty years ago my first experience of this was in a neighbour's garden. He had recently built himself a house, and was laying out and sowing his flower-beds with great care. It so happened that one of the beds lay over a large ants' nest, and to his dismay he found one morning a huge pit dug in the centre of it, to the total destruction of all his tender annuals, by a bear that had wandered through the station during the night. Tickell describes the operation thus: "On arriving at an ant-hill the bear scrapes away with the fore-feet till he reaches the large

combs at the bottom of the galleries. He then with violent puffs dissipates the dust and crumbled particles of the nest, and sucks out the inhabitants of the comb by such forcible inhalations as to be heard at two hundred yards distant or more. Large larvæ are in this way sucked out from great depths under the soil."

Insects of all sorts seem not to come amiss to this animal, which systematically hunts for them, turning over stones in the operation.

The Sloth Bear has usually two young ones at a birth. They are born blind, and continue so till about the end of the third week. The mother is a most affectionate parent, defending her offspring with the greatest ferocity. A she-bear with cubs is always an awkward customer, and she continues her solicitude for them till they are nearly full grown. The young ones are not difficult to rear if ordinary care be taken. The great mistake that most people make in feeding the young of wild animals is the giving of pure cows' milk. I mentioned this in 'Seonee' in speaking of a bear:—

"The little brute was as savage as his elders, and would do nothing but walk to the end of the string by which he was attached to a tent peg, roll head over heels, and walk in a contrary direction, when a similar somersault would be performed; and he whined and wailed just like a child; one might have mistaken it for the puling of some villager's brat. Milford was going to give it pure cows' milk when Fordham advised him not to do so, but to mix it with one half the quantity of water. 'The great mistake people make,' he said, 'who try to rear wild animals, is to give them what they think is best for them, viz., good fresh cows' milk, and they wonder that the little creatures pine away and die, instead of flourishing on it. Cows' milk is too rich; buffalos' milk is better, but both should be mixed with water. It does not matter what the animal is: tiger-cub, fawn, or baby monkey—all require the same caution.'"

I had considerable experience in the bringing up of young things of all sorts when in the Seonee district, and only after some time learnt the proper proportions of milk and water, and also that regularity in feeding was necessary—two-thirds water to one of milk for the first month; after that half and half.

The Sloth Bear carries her cubs on her back, as do the opossums, and a singular little animal called the koala (*Phascolarctos cinereus*)—and she seems to do this for some time, as Mr. Sanderson writes he shot one which was carrying a cub as large as a sheep-dog.

In that most charming of all sporting books ever written, Campbell's 'Old Forest Ranger,' there is an amusingly-told bit with reference to this habit of cub-carrying which I am sure my readers will forgive me for extracting. Old Dr. Jock M'Phee had been knocked over by a she-bear, and is relating his grievances to Charles:—

Well, as I was saying, I was sitting at my pass, and thinking o' my old sweethearts, and the like o' that, when a' at ance I heard a terrible stramash among the bushes, and then a wild growl, just at my very lug. Up I jumps wi' the fusee in my hand, and my heart in my mouth, and out came a muckle brute o' a bear, wi' that wee towsie tyke sitting on her back, as conciety as you please, and haudin' the grip like grim death wi' his claws. The auld bear, as soon as she seed me, she up wi' her birse, and shows her muckle white teeth, and grins at me like a perfect cannibal; and the wee deevil he sets up his birse too, and snaps his bit teeth, and tries to grin like the mither o't, with a queer auld farrant look that amaist gart me laugh; although, to tell the blessed truth, Maister Charles, I thought it nae laughing sport. Well, there was naething else for it, so I lets drive at them wi' the grit-shot, thinking to ding them baith at ance. I killed the sma' ane dead enough; but the auld one, she lets a roar that amaist deeved me, and at me she comes like a tiger. I was that frighted, sir, I did na ken what to do; but in despair I just held out the muzzle o' the fusee to fend her off, and I believe that saved my life, for she gripped it atween her teeth, dang me o'er the braid o' my back, and off she set, trailing me through the bushes like a tether-stick; for some way or other I never let go the grip I had o' the stock. I was that stupefied I hae nae recollection what happened after this, till I found mysel' sticking in the middle o' a brier-bush, wi' my breeks rived the way you see, and poor old 'Meg' smashed in bits—de'el be in her skin that did it."

Poor old Jock M'Phee! On the whole he did well to escape with but injury to his garments. I have seen several men mauled by she-bears; one of them was scalped and torn to such an extent that it was a long time before he recovered; and I always marvelled to think he got over it at all.

The British soldier is rather fond of a bear cub as a pet; and Captain Baldwin tells an amusing story of one which followed the men on to the parade ground, and quite disorganised the manœuvres by frightening the colonel's horse. In 1858 I was quartered for a time with a naval brigade; and once, when there was an alarm of the enemy, Jack went to the front with all his pets, including Bruin, which brought up the rear, shuffling along in blissful ignorance of the bubble reputation to be found at the cannon's mouth.

Although as a rule vegetarian, yet this species is not altogether free from the imputation of being a devourer of flesh when it comes in its way. In such cases it possibly has been impelled by hunger, and I doubt whether it ever kills for the sake of eating. I have known even ruminants eat meat, and in their case hunger could not have been urged as an excuse. Mr. Sanderson mentions an instance when a Barking Deer he shot was partially devoured by a bear during the night.

Very few elephants, however steady with tigers, will stand a bear. Whether it is that bears make such a row when wounded, or whether there be anything in the smell, I know not, but I have heard many sportsmen allude to the fact. A favourite elephant I had would stand anything but a bear and a pig. Few horses will approach a bear, and this is one difficulty in spearing them; and for this reason I think bear dancers should be prohibited in towns. Calcutta used to swarm with them at one time. It always makes me angry when I see these men going about with the poor brutes, whose teeth and claws are often drawn, and a cruel ring passed through their sensitive nostrils. I should like to set an old she-bear after the *bhalu-wallas*, with a fair field and no favour.

The bear rising to hug its adversary is a fallacy as far as this species is concerned; it does not squeeze, but uses its claws freely and with great effect.

I think we have now exhausted our Indian bears. Some have spoken of a dwarf bear supposed to inhabit the Lower Himalayas, but as yet it is unknown—possibly it may be the *Ailuropus*. We now come to the Bear-like animals, the next in order, being the Racoons (*Procyon*), Coatis (*Nasua*), Kinkajous (*Cercoleptes*), and the Cacomixle (*Bassaris*) of North and South America, and then our own Panda or Cat-Bear (*Ailurus fulgens*).

This, with the above-mentioned Racoons, &c., forms a small group of curious bear-like animals, mostly of small size. Externally they differ considerably, especially in their long bushy tails, but in all essential particulars they coincide. They are plantigrade, and are without a cæcum or blind gut; the skull, however it may approach to a viverrine or feline shape, has still marked arctoid characteristics. The ear passage is well marked and bony, as in that of the bear, but the bulb of the drum (*bulla tympani*) is much developed, as in the dogs and cats. The molars are more tuberculated than in the bears, resembling the hinder molars of a dog.

AILURIDÆ.

F. Cuvier, who received the first specimen of the type of this family from his son-in-law, M. Duvaucel, was not happy in his selection of a name, which would lead one to suppose that it was affixed to the cats instead of the bears. It certainly in some degree resembles the cat externally, and it has also semi-retractile claws, but in greater measure it belongs to the Arctoidea. There are only two genera as yet known —the Red Cat-Bear, *Ailurus fulgens*, and the Thibetan *Ailuropus melanoleucos*.

GENUS AILUROPUS.

This very rare and most curious animal should properly come between the bears and *Ailurus*, as it seems to form a link between the two. Such also is the idea of a naturalist friend of mine, who, in writing to me about it, expressed it as being a link between *Helarctos Malayanus* and *Ailurus fulgens*. Very little is, however, known of the creature, which inhabits the most inaccessible portions of a little-known country —the province of Moupin in Eastern Thibet. It was procured there by the Abbé David, who, after a prolonged residence in China, lived for nearly a year in Moupin, and he sent specimens of the skull, skin, &c., to M. Alphonse Milne-Edwards, from whose elaborate description in his 'Recherches sur les Mammifères' I have extracted the following notice. The original article is too long to translate *in extenso*, but I have taken the chief points.

No. 168. AILUROPUS MELANOLEUCOS.

HABITAT.—The hilly parts Moupin, Easter Thibet.

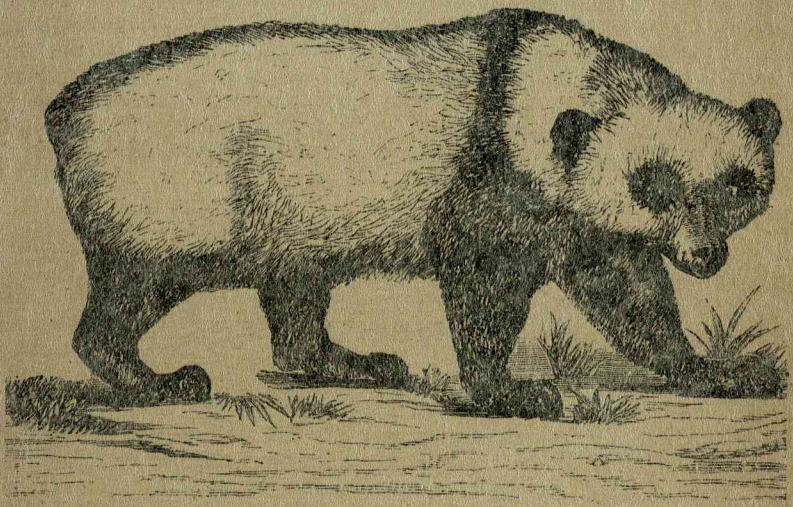
DESCRIPTION.—The *Ailuropus* has a thick-set heavy form. His head is short, rather slender in front, but extremely enlarged in the middle and after part; the nose is small and naked at its extremity; the forehead very large and convex; the eyes are small; the ears short, wide between and rounded at the ends; neck thick and very strong; the body is squat and massive; the tail is so short as to be hardly distinguishable. The feet are short, very large, nearly of the same length, terminated by five toes very large and with rounded ends, the general conformation of which recalls in all respects those of the bears, but of which the lower parts, instead of being completely placed on the sole in walking and entirely naked or devoid of hair, are always in great measure raised, and abundantly clad with fur to almost their full extent.

On the hind feet can be noticed at the base of the toes a transverse range of five little fleshy pads, and towards the anterior extremity of the metatarsal region another naked cushion placed transversely; but between these parts, as well as the posterior two-thirds of the planta, the hair is as abundant and as long almost as on the upper part of the foot. In the fore-limbs the disposition is much the same, though the metacarpal cushion may be larger; and there is another fleshy pad without hair near the claws.

The *Ailuropus* is thus an animal not strictly plantigrade, like the Bears in general, or the same as the Polar Bear, of which the feet, although placed flat on the earth, are not devoid of hair; but, on the

contrary, the *Ailuropus* resembles the *Ailurus*, which is semi-plantigrade yet hairy under its soles.

The colouring of the *Ailuropus* is remarkable: it is white with the exception of the circumferences of the eyes, the ears, the shoulders, and the lower part of the neck which are entirely black. These stand out clearly on a groundwork of slightly yellowishwhite; the spots round the eyes are circular, and give a strange aspect to the animal; those on the shoulders represent a sort of band placed transversely across the withers, widening as they descend downwards to lower limbs. The hinder limbs are also black from the lower part of the thigh down



Ailuropus melanoleucos.

to the toes, but the haunches, as also the greater part of the tail, are as white as the back and belly; the colouring is the same in young and old. The fur is long, thick, and coarse, like that of the bears.

From the general form of the skull it would seem impossible to determine the family to which this animal belongs. In effect the head differs considerably from the *Ursidæ* and the *Mustelidæ*, and presents certain resemblances to that of the hyæna; but there are numerous and important particulars which indicate a special zoological type, and it is only by an inspection of the dental system that the natural affinities of the *Ailuropus* can be determined.

In the upper jaw the incisors are, as usual, in three pairs. They are remarkable for their oblique direction; the centre ones are small and a little widened at the base; the second pair are stronger and dilated towards the cutting edge; the external incisors are also strong and excavated outside to admit the canines of the lower jaw. The canines are stout, but short, with a well-marked blunt ridge down the posterior side, as in the Malayan bears.

The molars are six in number on each side, of which four are premolars, and two true molars. The first premolar, situated behind, a little within the line of the canine, is very small, tuberculiform, and a little compressed laterally. The second is strong and essentially carnassial; it is compressed laterally and obliquely placed. It is furnished with three lobes: the first lobe is short, thick, and obtuse; the second is raised, triangular and with cutting edges; the third of the size of the first, but more compressed—in short, a double-fanged tooth. This molar differs considerably from the corresponding tooth of the bear by its form and relative development, since in that family it is one-fanged, very low and obtuse. On the contrary, it approaches to that of the hyænas and felines. With the panda (*Ailurus fulgens*) the corresponding premolar is equally large, double-fanged and trenchant, but the division in lobes is not so marked.

The third or penultimate molar of the *Ailuropus* is larger and thicker than the preceding, divided in five distinct lobes—three outer ones in a line, and two less projecting ones within.

The last premolar is remarkably large; it is much larger behind than in front, and its crown is divided into six lobes, of which five are very strong; the three external ones are much developed and trenchant, the centre one being the highest and of a triangular shape. Of the internal lobes, the first one is almost as large as the external ones; the second is very small, almost hidden in the groove between the last mentioned; and the third, which is very large, rounded and placed obliquely inwards in front, and outwards behind. Professor Milne-Edwards remarks that he knows not amongst the carnivora a similar example of a tooth so disposed. That of *Ailurus* shows the least difference, that is to say it is nearest in structure, having also six lobes, but more thick-set or depressed.

The true molars are remarkable for their enormous development: the first is almost square, with blunt rounded cusps, four-fanged, and presenting a strange mixture of characteristics, in its outward portion resembling an essentially carnivorous type, and its internal portion that of molars intended to triturate vegetable substances. Amongst bears, and especially the Malayan bears, this character is presented, but in a less striking degree; the panda resembles it more, with certain restrictions, but the most striking analogy is with the genus *Hyænarctos*.

last molar is peculiar in shape, longer than broad, and is tuberculous, as in the bears, but it differs in this respect from the pandas, in which the last molar is almost a repetition of the preceding one, and its longitudinal diameter is less than its transverse.

In the lower jaw the first premolar, instead of being small and tuberculate, as its corresponding tooth in the upper jaw, is large, double-fanged, trenchant and tri-lobed, resembling, except for size, the two following ones. The second is not inserted obliquely like its correspondent in the upper jaw, its axis is in a line with that of its neighbours; tricuspidate, the middle lobe being the highest. The third premolar is very large, and agrees with its upper one, excepting the lobule on the inner border.

The first true molar is longer than broad, and wider in front; the crown, with five conical tubercles in two groups, separated by a transverse groove; the next molar is thicker and stouter than the preceding one, and the last is smaller, and both much resemble those of the bears, and differ notably from the pandas.

From what M. Milne-Edwards describes, we may briefly epitomise that the pre-molarial dentition of the *Ailuropus* is ailuroid or feline, and that the true molars are arctoid or ursine.

The skull is remarkable for the elongation of the cranium and the elevation of the occipital crest, for the shortness of the muzzle, for the depression of the post-frontal portion, and for the enormous development of the zygomatic arches. In another part M. Milne-Edwards remarks that there is no carnivorous animal of which the zygomatic arches are so developed as in the *Ailuropus*. He states that it inhabits the most inaccessible mountains of Eastern Thibet, and it never descends from its retreats to ravage the fields, as do the Black Bears; therefore it is difficult to obtain. It lives principally on roots, bamboos and other vegetables; but we may reasonably suppose from its conformation that it is carnivorous at times, when opportunity offers, as are some of the bears, and as is the *Ailurus*. I have dwelt at some length on this animal, though not a denizen of India proper; but it will be a prize to any of our border sportsmen who come across it on the confines of Thibet, and therefore I have deemed it worthy of space.

SIZE.—From muzzle to tail, about four feet ten inches; height about twenty-six inches.

GENUS AILURUS.

No. 169. AILURUS FULGENS.

The Red Cat-Bear (Jerdon's No. 92).

NATIVE NAMES.—*Wah*, Nepal; *Wah-donka*, Bhot.; *Sunnam* or *Suknam*, Lepch.; *Negalya*, *Ponya* of the Nepalese (*Jerdon*). In the Zoological Gardens in London it is called the *Panda*, but I am unable just now to state the derivation of this name.

HABITAT.—Eastern Himalayas and Eastern Thibet.

Ailurus fulgens.

DESCRIPTION.—"Skull ovate; forehead arched; nose short; brain case ovate, ventricose; the zygomatic arches very large, expanded; crown bent down behind" (*Gray*). The lower jaw is very massive, and the ascending ramus unusually large, extending far above the zygomatic arch, forming almost a right angle with equal arms. Hodgson's description is: "Ursine arm; feline paw; profoundly cross-hinged, yet grinding jaw, and purely triturative and almost ruminant molar of *Ailurus*; tongue smooth; pupil round; feet enveloped in woolly socks with leporine completeness." It walks like the marten; climbs and fights with all the four legs at once, like the *Paradoxuri*, and does not employ its forefeet—like the racoon, coatis, or bears—in eating."

Jerdon's outward description is: "Above deep ochreous-red; head and tail paler and somewhat fulvous, displayed on the tail in rings; face, chin, and ears within white; ears externally, all the lower surface and the entire limbs and tip of tail jet-black; from the eye to the gape a broad vertical line of ochreous-red blending with the dark lower surface; moustache white; muzzle black."

The one at present in the London "Zoo" is thus described: "Rich red-chestnut in colour on the upper surface, jet black as to the lower surface, the limbs also black, the snout and inside of ears white; the tail bushy, reddish-brown in colour and indistinctly ringed."

SIZE.—Head and body 22 inches; tail 16; height about 9; weight about 8 lbs.

Jerdon has epitomised Hodgson's description of the habits of this animal as follows: "The Wah is a vegetivorous climber, breeding and feeding chiefly on the ground, and having its retreat in holes and clefts of rock. It eats fruits, roots, sprouts of bamboo, acorns, &c.; also, it is said, eggs and young birds; also milk and ghee, which it is said to purloin occasionally from the villages. They feed morning and evening, and sleep much in the day. They are excellent climbers, but on the ground move rather awkwardly and slowly. Their senses all appear somewhat blunt, and they are easily captured. In captivity they are placid and inoffensive, docile and silent, and shortly after being taken may be suffered to go abroad. They prefer rice and milk to all other food, refusing animal food, and they are free from all offensive odour. They drink by lapping with the tongue, spit like cats when angered, and now and then utter a short deep grunt like a young bear. The female brings forth two young in spring. They usually sleep on the side, and rolled into a ball, the head concealed by the bushy tail." (For the full account see 'Jour. As. Soc. Beng.' vol. xvi. p. 1113.)

Mr. Bartlett, who has studied the habits of the specimen in the London Gardens, says that in drinking it sucks up the fluids like a bear instead of licking it up like a dog or cat, which disagrees with what Hodgson states above. "When offended it would rush at Mr. Bartlett, and strike at him with both feet, the body being raised like a bear's, and the claws projecting."

General Hardwicke was the first to discover this animal, which he described in a paper read before the Linnæan Society on the 6th of November 1821, but it was not published for some years, and in the meanwhile M. Duvaucel sent one to M. F. Cuvier, who introduced it first to the world. Some years ago I had a beautiful skin of one offered to me for sale at Darjeeling by some Bhotias, but as it was redolent of musk and other abominations quite foreign to its innocent inodorous self, I declined to give the high price wanted for it.

SEMI-PLANTIGRADES.

These form part of the Plantigrada of Cuvier and part of the Digitigrada; they walk on their toes, but at the same time keep the wrist and heel much nearer to the ground than do the true Digitigrades, and sometimes rest on them. Of those Semi-plantigrades with which we now have to deal there are three sections, viz., the *Mustelidæ*, containing the Gluttons, Martens, Weasels, Ferrets, Grisons, &c., the *Melidæ*, *Melididæ* and *Melinidæ* of various authors: i.e. Badgers, Ratels, and Skunks; and the *Lutridæ* or Otters. Some writers bring them all under one great family, *Mustelidæ*, but the above tripartite arrangement is, I think, better for ordinary purposes. To the mind of only moderate scientific attainments, a distinct classification of well-defined groups is always an easier matter than a large family split up into many genera defined by internal anatomical peculiarities.

Of the Semi-plantigrades at large Jerdon remarks: "None of them have more than one true molar above and another below, which, however, vary much in development, and the flesh tooth is most marked in those in which the tuberculate is least developed, and *vice versa*. The great and small intestines differ little in calibre, and many of them (i.e. the family) can diffuse at will a disgusting stench." This last peculiarity is a specialty of the American members of the family, notably the skunk, of the power of which almost incredible stories are told. I remember reading not long ago an account of a train passing over a skunk, and for a time the majority of the passengers suffered from nausea in consequence. Sir John Richardson writes: "I have known a dead skunk thrown over the stockades of a trading port produce instant nausea in several women in a house with closed doors, upwards of a hundred yards distant." The secretion is intensely inflammatory if squirted in the eye.

MELIDIDÆ; OR, BADGER-LIKE ANIMALS.

This group is distinguished by a heavier form, stouter limbs, coarse hair, and slower action; in most the claws are adapted for burrowing. None of them are arboreal, although in olden times marvellous tales were told of the wolverene or glutton as being in the habit of dropping down from branches of trees on the backs of large animals, clinging on to them and draining their life blood as they fled. Some of them are capable of emitting a noisome smell. The teledu of Java (*Mydaus meliceps*) is the worst of the family in this respect, and almost equals the skunk. It is possible that this animal may be found in Tenasserim

GENUS ARCTONYX.

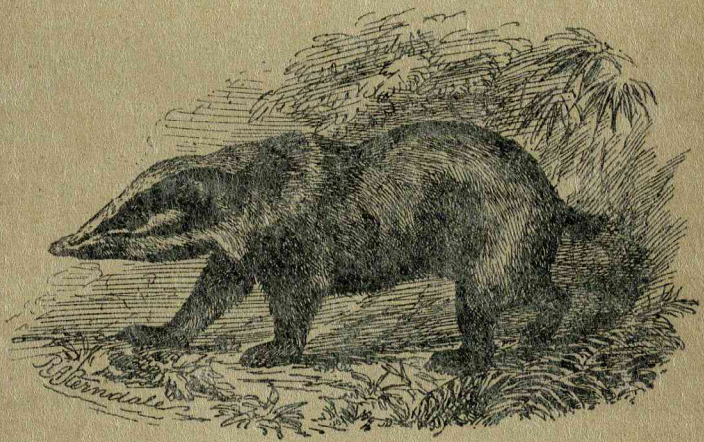
Dentition much the same as that of the Badger (*Meles*). Incisors, $\frac{6}{6}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{3-3}{3-3}$; molars, $\frac{1-1}{1-1}$. The incisors are disposed in a regular curve, vertical in the upper jaw, obliquely inclined in the lower; canines strong, grinders compressed; general form of the badger, but stouter. Feet five-toed, with strong claws adapted for digging, that of the index finger being larger than the other.

No. 170. ARCTONYX COLLARIS.

The Hog-Badger (*Jerdon's No.* 93).

NATIVE NAMES.—*Balu-suar*, Hind., Sand-pig, or, as Jerdon has it, *Bhalu-soor*, Hind., i.e. Bear-pig; *Khway-too-wet-too*, Arakanese.

HABITAT.—Nepal, Sikim, Assam, Sylhet, Arakan, extending, as Dr. Anderson has observed, to Western Yunnan. The late General A. C.



Arctonyx collaris.

McMaster found it in Shway Gheen on the Sitang river in Pegu. I heard of it in the forests of Seonee in the Central Provinces, but I never came across one.

DESCRIPTION.—"Hair of the body rough, bristly, and straggling; that of the head shorter, and more closely adpressed. Head, throat, and

breast yellowish white; on the upper part this colour forms a broad regularly-defined band from the snout to the occiput; ears of the same colour; the nape of the neck, a narrow band across the breast, the anterior portion of the abdomen, the extremities, a band arising from the middle of the upper lip, gradually wider posteriorly, including the eyes and ears, and another somewhat narrower arising from the lower lip, passing the cheek, uniting with the former on the neck, are deep blackish-brown" (*Horsfield*). The tail is short, attenuated towards the end, and covered with rough hairs.

SIZE.—From snout to root of tail, 25 inches; tail, 7 inches; height at the rump, 12 inches.

M. Duvaucel states that "it passes the greatest part of the day in profound somnolence, but becomes active at the approach of night; its gait is heavy, slow, and painful; it readily supports itself erect on its hind feet, and prefers vegetables to flesh."

Jerdon alludes to all this, and adds, "one kept in captivity preferred fruit, p'antains, &c., as food, and refused all kinds of meat. Another would eat meat, fish, and used to burrow and grope under the walls of the bungalow for worms and shells." My idea is *Balu-suar*, or Sand-pig is the correct name, although *Bhalu-suar* or Bear-pig may hit off the appearance of the animal better, but its locality has always been pointed out to me by the Gonds in the sandy beds of rivers in the bamboo forests of Seonee; and Horsfield also has it *Baloo-soor*, Sand-pig.

Bewick, who was the first to figure and describe it, got, as the vulgar phrase hath it, the wrong pig by the lug, as he translates it *Sand-bear*. McMaster also speaks of those he saw as being in deep ravines on the Sitang river.

The stomach of Arctonyx is simple; there is no cæcum, as is the case also with the bears; the liver has five lobes; under the tail it has glands, as in the Badgers, secreting a fatty and odorous substance.

No. 171. ARCTONYX TAXOIDES.

The Assam Badger.

HABITAT.—Assam and Burmah.

DESCRIPTION.—Smaller than the last, with longer and finer fur, narrower muzzle, smaller ears, shorter tail, and more distinct markings. The measurement of the respective skulls show a great difference. The length of a skull of a female of this species given by Dr. Anderson is 4·75 inches against 6·38 of a female of *A. collaris*. The breadth across the zygomatic arch is 2·38 against 3·64 of *A. collaris*. The breadth of the palate between the molars is only 0·81 against 1·07.

GENUS MELES.

SUB-GENUS TAXIDIA.

This sub-genus is that of the American type of Badger, to which Hodgson, who first described the Thibetan *T. leucurus*, supposed his species to belong; but other recent naturalists, among whom are Drs. Gray and Anderson, prefer to class it as *Meles*. Hodgson founded his classification on the dentition of his specimen, but Blyth has thrown some doubt on its correctness, believing that the skull obtained by Hodgson with the skin was that of *Meles albogularis*. Hodgson, however, says: "from the English Badger type of restricted *Meles* our animal may be at once discriminated without referring to skulls by its inferior size, greater length of tail, and partially-clad planta or foot-sole."

No. 172. MELES (TAXIDIA) LEUCURUS.

The Thibetan White-tailed Badger.

NATIVE NAME.—*Tampha.*

HABITAT.—The plains of Thibet.

DESCRIPTION.—Fur long, flaccid, dark iron-grey and white mixed; hair long, white, with a broad sub-lunate black band and a white tip; under fur abundant, long, white; a streak on each side of the forehead blackish grey, varied; chin, throat, legs and under side of the body black; tail, sides of head, and body whitish."—*Gray.*

The aspect, according to Hodgson, is entirely that of a long-tailed Badger (Gray remarks: "it most resembles the European animal"), with somewhat smaller head, with longer, finer fur than usual; the entire sole of the foot is not naked, but only about two-thirds, and the toe-pads are very much developed, thus raising the powerful long fossorial claws from the ground in walking.

SIZE.—Total length 37 inches, of which the tail, with the hair, is 10 inches, and without the hair 7 inches; the longest hair of the body is $4\frac{1}{2}$ inches.

There is not much known about the *Tampha*. According to what Hodgson was able to gather concerning his habits, "he dwells in the more secluded spots of inhabited districts, makes a comfortable, spacious and well-arranged subterraneous abode, dwells there in peace with his mate, who has an annual brood of two to four young, molests not his neighbour, defends himself if compelled to it with unconquerable resolution, and feeds on roots, nuts, insects and reptiles, but chiefly the two former—on vegetables, not animals—a point of information confirmed by the prevalent triturant character of the teeth." The colouring of this

animal is almost identical with the English badger, only that his tail is longer and whiter.

No. 173. MELES ALBOGULARIS.

The White-throated Thibetan Badger.

HABITAT.—Thibet.

DESCRIPTION.—Smaller and much less tufted ears than the last species; a shorter and much less bushy tail; and the fur shorter and coarser, though of finer texture than in the European badger, with much woolly hair at its base. Both the English badger and *M. leucurus* are black throated; this one is white throated. The English animal has a broad band of brownish-black, which begins between the muzzle and the eye, and runs through the eye and ear till it fades off on the neck; the space of white between these two bands on the forehead runs back and contracts behind the ears. In the Thibetan animal it contracts just behind the eyes, and is continued as a faint narrow streak only as far as the ears. In the English one the cheeks are broadly white between the eye-band and the black throat; in the Thibetan there is a little white below the eye, and this is bordered by a narrow black stripe, beneath which is the white throat.

There is another Thibetan badger mentioned by Professor Milne-Edwards in his 'Recherches sur les Mammifères,' a white-throated one, *M. obscurus*, but it appears to be the same as *M. albogularis*.

GENUS MELLIVORA.

Tubercular grinder transverse; flesh-tooth larger, with a small internal lobe, and with a single tubercle; lower flesh-tooth tricuspidate, sharp-edged; head depressed; nose blunt; ears not visible externally; body stout, depressed; legs short, and strong; feet plantigrade, five-toed; front claws elongated and strong; the bald sole of the hind foot occupying the whole under surface, only slightly divided across about one-third of its length from the front; tail very short, with powerfully offensive glands; it has a thick loose skin and a subcutaneous layer of fat, which doubtless protect it from stings of bees, on which this genus is supposed to feed whenever it can.

No. 174. MELLIVORA INDICA.

The Indian Ratel or Honey-Badger (Jerdon's No. 94).

NATIVE NAME.—*Biju*, Hind.; *Biyu-khawar*, Telegu; *Tavakaradi*, Tamil; *Bajru-bhal*, at Bhagulpore (Santali?); *Bharsiah*, Nepalese.

HABITAT.—Throughout India.

DESCRIPTION.—The upper half of its body is ashy-grey; the lower half, muzzle, limbs, and tail black; the general appearance is that of a black animal with a grey cloak on its back. The only difference between the Indian and the Cape Ratel is, that the grey cloak of the latter has a conspicuous white border which is wanting in the Indian species; the tail also of the latter is shorter, otherwise they are the same, and were for a long time considered the same.

SIZE.—Head and body, 26 to 32 inches; tail, 5 to 6 inches.

Jerdon says it is chiefly found in hilly districts, and that he has not found it in Lower Bengal nor on the Malabar coast. In Central India it is not uncommon. It has got a reputation for digging into graves, and is called in some parts "the grave-digger;" but I do not believe in its carnivorous propensities to this extent; it lives principally on small fry,

Mellivora Indica.

insects, and small animals, honey and vegetable food. Jerdon says it is destructive to poultry, which is probable, for it will eat small birds. Both it and the Cape species will eagerly look out for bees, but it is not to be supposed, as some books would make out, that bees and honey form the staple diet. Its thick and loose skin, the stiffness of the hair above, and the layer of fat below, effectually preserve it from the effects of the stings. The tail glands contain a very strong and pungent secretion.

Some years ago, before I knew exactly what they were, the Ratels in the London Zoological Gardens used to interest me greatly. They had a low cage, on the ground I think, and their peculiar antics never failed to draw a crowd. They used to run round in an idiotic sort of way, and always at one point gravely turn head over heels and then proceed

before and repeat. In Cassell's 'Natural History' this is alluded to, only the writer says that now they are in fresh quarters, and the flitting seems to have disturbed them. He adds: "We have often watched one of them run round and round the cage in the usual purposeless manner of captive animals, but with this peculiarity: when he reached a particular corner of the den, he quietly, and without effort, turned head over heels, and then went on again. On one occasion, after he had been doing this with great regularity for some rounds he seemed to become abstracted, and passed the usual spot without the somersault; when, however, he had proceeded a few paces he recollected himself, stopped for a moment, returned to the exact place, turned over as usual, and proceeded without further let or hindrance." The African species is said to live largely on bees—I suppose ground bees, such as our English humble bee, for these animals are not arboreal—and it is said to exhibit great skill in tracking the flying insects to their nest. "Sparrman states that it seats itself on a hillock to look for the bees, and shades its eyes with one forepaw against the rays of the setting sun." Here is something for our Indian naturalists to observe. Some other animals are said to do the same; whether the Biju does it or not I cannot say. McMaster says of it: "Two that I saw in confinement appeared very good-tempered, and much more playful than tame bears would have been. They were, I think, fed entirely upon vegetables, rice and milk." This animal is the same as Hodgson's *Ursitaxus inauritus*, the *Bharsiah* which figures as a separate genus in Cuvier. The skull is very like that of the wolverenes in general form.

GENUS GULO—THE GLUTTON OR WOLVERENE.

This animal was placed by Linnæus among the *Ursidæ*, and is classed by some with the *Melididæ*, but its dentition is more that of the Martens, which occupy the next group. The true Glutton (*Gulo luscus*) is not known in India, but we have some so-called Wolverenes (*Helictis*) to which I shall presently allude. Still a few remarks about the typical animal, which is by no means an uninteresting creature, may not be out of place. The Glutton inhabits a wide tract of country in the Northern Hemisphere, the colder regions of Europe, Asia, and America; it is abundant in Siberia and Kamschatka, and is the pest of the trappers in North America. Fabulous stories were told of this animal in olden days, some of which are still propagated at the present time. It was supposed to be of insatiable appetite, and to attack its prey (deer, &c.) by dropping down from the branch of a tree on to the back of its victim, and to eat its way into a vital part, whilst being carried along—a decided fallacy,

for neither the Glutton nor our Indian species of *Helictis* are arboreal in their habits. Then it was accused of eating to such a pitch of distention that it had to squeeze itself between two close-growing trees for relief ere it returned again to the repast. There is no doubt, however, that it is to a great extent voracious and extremely cunning; and what it cannot eat it will carry off and hide. The trappers complain bitterly of it, and spare no pains to kill every one they can come across; but it is not easily to be caught, and only a very cunningly-devised bait will succeed.

Were I to relate some of the stories recorded of this animal I might get accused, if not of being a romancer myself, at all events of being a too credulous propagator of other people's romances. It is told of it that it will discover hidden stores, and, digging them up out of the snow, carefully smooth the surface over again; that it will avoid every trap set for itself, and, going round to the back of spring guns, gnaw through the string connected with the trigger before it drags away the bait. It follows up the lines laid down by the trappers, taking the martens out, and devouring them, or hiding what it cannot eat, and by wearying out the patience of the hunters, compel them to strike a new "marten-road."

It is said by Dr. Coues to possess a singular habit of sitting down on its haunches, shading its eyes with a forepaw, and gazing earnestly at the approaching enemy before it takes to flight. I have already alluded to the Cape ratel doing this on the look-out for bees. The Indian form of Wolverene is a slighter and much smaller animal, with a still more weasel-like appearance. The Glutton is comparatively a large beast, the body being about 2½ feet, and the tail 10 inches; the *Helictis* is only half the size, and there is a slight difference in the dentition.

GENUS HELICTIS.

"Head tapering; nose acute, conical; muzzle bald, obliquely truncated; other side hairy, with a central groove; nostrils inferior; ears ovate; body slender; legs short; toes 5:5; front claws elongate, curved; hinder short and acute; sole of foot hairy behind, bald in front, and rhombic for half the length of the foot, with three large oblong pads on the front, and three small ones on the hinder edge; toes elongate; thumb short; fur black, like *Herpestes*; tail moderate, sub-cylindrical; teeth, 38; pre-molars, $\frac{4-4}{4-4}$; grinders, $\frac{5}{6}$."—*Gray.*

There are four species of this genus, and of these two come within the geographical limits of these papers, viz., *Helictis Nipalensis* and *H. moschata*; the third, *H. orientalis*, belongs to Java; and the fourth, *H. subaurantiaca*, to Formosa.

No. 175. HELICTIS NIPALENSIS.

The Nepal Wolverene (Jerdon's No. 95).

NATIVE NAME.—*Oker*, Nepalese; *Kyoung-pyan*, Arakanese.

HABITAT.—Nepal, Arakan, and Pegu.

DESCRIPTION.—Hodgson, who first described this animal in the 'Journal of the Asiatic Society of Beng.' (vol. v. pp. 237–38), says: "Above earthy brown; below, with the edge of the upper lip, the insides of the limbs, and terminal half of the tail, yellow; a white mesial stroke from the nape to the hips, and a white band across the forehead, spreading on the cheeks, and confluent with the pale colour of the animal's lower surface; head and body vermi-formed; digits and nails of the anterior extremities stronger; half way from the os calcis to the fingers hairy; fur of two sorts and abundant, but not lengthened, nor harsh, nor annulated; tail cylindrico-tapered, pointed, half the length of the animal." He goes on to add: "The anterior limbs are decidedly fossorial, and the hinder suited for walking in a sub-plantigrade manner; both wholly unfitted for rapatory or scansorial purposes."

SIZE.—Head and body 16 inches; tail 7½ inches, 9 inches, including hair.

The habits of this animal are nocturnal. Swinhoe mentions this in his account of the Formosan species, and Dr. Anderson relates that he is aware that the Nepal one is similar in its ways, and that it not unfrequently enters Bhotia huts at night; and on one occasion he killed one in a Bhotia hut, thinking it was a large rat, greatly to the chagrin of his host, who informed him that the animal was in the habit of visiting him nightly, and was most useful in destroying cockroaches and other insects.

No. 176. HELICTIS MOSCHATA.

The Chinese Wolverene.

HABITAT.—China, also Burmah (Pegu, Yunnan).

DESCRIPTION.—Similar to the last, but differing in dentition and the formation of certain points in the skull. The teeth are smaller, and the infra-orbital foramen much larger. Both the above species are noted for long skulls and palate, whereas *H. orientalis* has a short skull and palate. The following are the chief characteristics:—

Short head and palate, large teeth, *small* infra-orbital foramen = *H. orientalis.*

Long head and palate, large teeth, *small* infra-orbital foramen = *H. Nipalensis.*

Long head and palate, *small* teeth, *large* infra-orbital foramen = *H. moschata.*

Dr. Anderson obtained a specimen of this species at an elevation of 5000 feet, at Teng-yue-chow in Yunnan.

MUSTELIDÆ—MARTENS AND WEASELS.

In India the members of this family are restricted to the Weasels and Martens, but in other countries are included the Grisons, Zorillas, Skunks, &c. They are small animals of elongated form, with short legs, commonly expressed as vermiform; where the head of a weasel will go his body will follow—at least that was my experience in my boyish days, when I was particularly interested in vermin, and the gamekeeper was my first instructor in natural history. The face is rounded like a cat, but the skull behind the eye is very long and pear-shaped when viewed from above; in proportion to a cat's skull the brain case is a fourth longer. They are most sanguinary in their habits, and their agility is great, so on the whole they are most formidable to many animals, not only smaller, but in many cases four times their own size. The ferocity of the common weasel (*Putorius vulgaris*) ought to be as proverbial as its watchfulness. A case has been known of a kite carrying off one of these animals, but falling dead after a time with the large blood-vessels under the wing cut through by the savage little prisoner, who, on reaching *terra firma*, escaped apparently unhurt. I think in Wolff's admirable 'Illustrations of Natural History' this fact, related by Bell, is made the subject of a picture called "Catching a Tartar."

Most of the animals of this group are eagerly sought for on account of their fur. In Northern India the skin of one species, probably a variety of *Martes abietum*, is sold in the bazaars at Peshawur and Lahore. In 1868 I bought sufficient to line a large overcoat, which proved most comfortable in travelling in the cold weather in the Punjab, as well as in subsequent wanderings on the European continent in winter.

Dr. E. Coues, in his monograph on the North American Mustelidæ, gives the following interesting information regarding the number of skins of various species sold by the Hudson's Bay Company in London during the century 1769–1868:—

Sables, 1,240,511; otters, 674,027; wolverenes, 68,694; minks, 1,507,240; skunks, 218,653; badgers, 275,302; sea otters, 5349. In 1868, which appears to have been a prosperous year, the Company sold: Sables, 106,254; otters, 14,966; wolverenes, 1104; minks, 73,473; skunks, 6298; badgers, 1551; sea otters, 123.*

When one considers the number of those whose skins are damaged

* In the same year were sold by other firms, 22,000 otter skins and 4500 sables. See Appendix *C* for further statistics.

cast aside, the number that fall victims to larger predatory animals, and the operations of disease, from which no animals, small or great, are free, we may form some idea of the immense multitude of these little creatures.

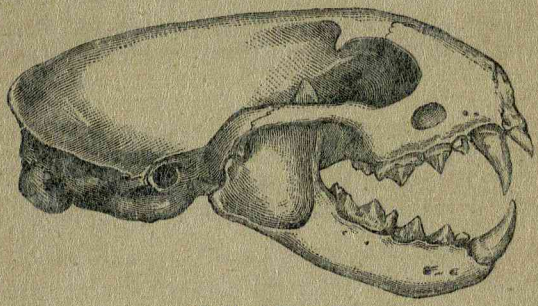
The ordinary divisions of the restricted Mustelidæ are the Martens (*Martes*), Pole-cats (*Putorius*), and Weasels (*Mustela*), but Gray has further subdivided them chiefly on the characteristics of the feet.

The Martens have four more teeth than the rest, which are distinguished as follows :—

Putorius.—Short ovate head ; feet very hairy, especially between the pads ; body stout ; underside blackish.

Mustela.—Narrow, elongated head ; feet very hairy between the pads ; slender body ; under-side yellow or white.

Vison.—Head elongate, narrow ; feet slightly hairy ; pads exposed ; body rather slender ; under-side same colour as upper.



Skull of *Putorius*.

Gymnopus.—Head elongate, narrow ; feet rather naked, bald beneath, between, and rather behind the pads ; toes largely webbed ; soles hairy behind ; body slender.

It is doubtful whether these distinctions are of sufficient importance to warrant so much subdivision ; and unnecessary multiplication of genera is a thing to be avoided as much as possible.

GENUS MARTES—THE MARTENS.

A more or less arboreal group of larger size, and possibly less sanguinary habits than the weasels, although in this respect I do not think there is much difference. The tail is longer, though not so long as the head and body, and it is bushy ; the fur is fine and in general

highly prized; the dentition differs from the typical *Mustela* in having four more teeth and an additional false molar on either side in each jaw; and the inner side of the carnassial or flesh tooth has a tubercle which is not present in the weasels; head elongate; feet very hairy; space between the pads hairy, often covering them from sight, except in the case of *Martes flavigula*, of which the soles are nude.

No. 177. MARTES FLAVIGULA.

The White-cheeked Marten (Jerdon's No. 96).

NATIVE NAMES.—*Mal-sampra*, Nepalese; *Tuturala* in Kumaon; *Kusiah* in Sirmoor; *Huniah* or *Aniar*, Bhotia; *Sakku*, Lepcha.

HABITAT.—Nepal, Thibet, Kumaon, Gurhwal, Sirmoor, Assam, Burmah, Ceylon.

DESCRIPTION.—Glossy blackish brown, with the throat and breast yellow; the chin and lower parts white, from which I have preferred to call it after Pennant "the White-cheeked Marten" instead of the "yellow-throated," this characteristic belonging also to some other species. The fur seems to vary a good deal. Jerdon says of it: "The body is at times dirty brownish or chestnut brown, or brown mixed with grey, and the middle of the back is sometimes paler than the rest, or the same tint as the sides of the body. In some the top of the head is pale brown, but it is edged by a dark peripheral line, and in some there are one or more irregular dark spots between the fore-limbs."

Blyth writes of the Burmese specimens that they are "similar to the Himalayan, but differing from the Malayan race—found also in Formosa—by having much longer fur, and a wholly black cap instead of a brown cap with a black periphery." The soles are nude.

SIZE.—Head and body about 20 inches; tail, including fur, 12 inches.

This Indian Marten, according to Jerdon, is also found in Ceylon; it was, however, appparently unknown to Kellaart, nor does Sir Emerson Tennent allude to it. It is to be had in the Neilgherries, the Khasia hills, and the ranges in Arakan, as well as in the valleys of the great Himalayan chain up to 7000 or 8000 feet of elevation. It is found in pairs or in small families of five or six. If hunted it takes to trees at once, being a good climber. According to Captain the Hon. C. Shore, who observed its habits in Kumaon and Gurhwal, "its food is chiefly birds, rats, mice, hares and even young fawns of the kakur or barking-deer." He adds: "The specimen sent to the Zoological Society was brought to me in September 1828, when it was about four months old. It had been caught when not many days old, and was so tame that it was always kept loose about a well, sporting about the windlasses, posts, &c., and playing tricks with the people who came to

draw water." This is the one alluded to by Jerdon as having been described by Mr. Bennett in the 'Gardens and Menageries of the Zoological Society.' *Martes Gwatkinsi* of Horsfield's Catalogue (page 99), is evidently, as Jerdon says, the same as *M. flavigula*, although the colouring is different, and is supposed to be the same animal in its summer fur, some specimens being darker than others. It is just one hundred years since this little animal was first described, the earliest record of it being in Pennant's 'History of Quadrupeds' (first edition), published in 1781. It must, however, have been known before that, for Pennant first observed it in Brooks's Menagerie in 1774, and named it the "White-cheeked Weasel," which Boddart afterwards in 1785 introduced into his 'Elenchus Animalium' under the name of *Mustela flavigula* (*Horsfield*).

No. 178. MARTES ABIETUM.

The Pine Marten.

HABITAT.—Ladakh and the Upper Himalayas, Afghanistan (?)

DESCRIPTION.—Brown; throat yellow or yellow spotted (*Gray*). Light yellowish-grey, rather deeper in a line along the back; the hair

Martes abietum.

brown; extremities blackish; chin, throat and breast white (according to Horsfield).

SIZE.—About 18 to 20 inches; tail 12 inches.

Horsfield remarks that the specimens received in the Indian Museum combine the peculiarities of the Pine and Beech Martens respectively, and lead to the conclusion that both are varieties of one species. This idea was prevalent some time ago, and the Beech Marten (*M. foina*) was supposed to be merely a variety of the Pine species, but there are certain differences in the skulls of the two animals. It is stated by the editor of my edition of Cuvier that, on examination of the crania of the two, he found that those of *M. abietum* are constantly smaller, with the zygomatic arch fully twice as strong as in the other. There is also a slight difference in the teeth, the hinder upper tubercular grinder in *M. foina* not being quite so large as in the other.

The Pine Marten has a wide distribution; the finest specimens are found in Sweden; in England it is becoming scarce, but in other parts of Europe and Asia it is common. Professor Parker and his brother write of it: "This animal is essentially arboreal in its habits, inhabiting chiefly thick coniferous woods, whence its name of Pine Marten is derived. In the branches the female makes a nest of leaves or moss, and sometimes spares herself this trouble by ejecting squirrels or woodpeckers, and occupying the vacant dwellings. For its size it is, like all the Mustelidæ, extremely ferocious and strong. It attacks and kills fawns, notwithstanding their superior size; from these down to mice nothing comes amiss to it, and nothing is safe from its attacks." It seems almost incredible that such a small animal should venture on such large game, but the same is reported of *M. flavigula*; and a much smaller creature, the Yellow-bellied Weasel, *M. kathiah*, is reported by Hodgson to attack even goats and sheep.

No. 179. MARTES TOUFŒUS.

NATIVE NAME.—*Toufee.*

HABITAT.—Thibet.

DESCRIPTION (from skins only).—General colour smoky brown, darker along the spine and on the limbs, but without marks, and paler to sordid yellowish hoary on the neck and head; head palest, except the mystaceal region and chin, which are embrowned; moustache moderate and dark brown.

SIZE.—Head and body about 20 to 22 inches.

The above description is taken from Hodgson, who had only received imperfect skins. Jerdon just alludes to it by name, but I cannot find it mentioned by any other author. As much stress cannot be laid on colouring in these animals, I feel inclined to think that it is a variety of *Martes abietum*, probably in its dark summer coat.

GENUS MUSTELA—THE WEASELS.

These are smaller animals of the true vermiform shape; the legs are very short in comparison with the body, and the neck is very thick and very long, and the head is small, so that head, neck, and body are almost equally cylindrical, and the length of the neck gives a far, set-back appearance to the forelegs, so much so that they seem to start from behind the chest instead of in front of it. The teeth are 34 in number, or four less than in the preceding genus; upper tubercular grinder transverse or broader than long; the feet are slightly webbed, covered with hair, and the space between the pads is hairy; the tail is short; fur dark above, white or yellowish beneath.

Mustela.

Some authors contend that the weasel, though commonly referred to the genus *Mustela*, should be *Putorius*, which is an instance of the disagreement which exists among naturalists. I have however followed Gray in his classification, although perhaps Cuvier, who classes the weasels and pole-cats under the genus *Putorius*, has the claim of priority. Ray applied the name of *Mustela* to the restricted weasels, and *Martes* to the martens, but Cuvier gives *Mustela* to the martens, and brings the weasels and pole-cats together under *Putorius*.

No. 180. MUSTELA (VISON: *Gray*) SUB-HEMACHALANA.

The Sub-Hemachal Weasel (*Jerdon's No.* 97).

NATIVE NAMES.—*Zimiong*, Bhotia; *Sang-king*, Lepcha; *Kran* or *Gran*, Kashmiri.

DESCRIPTION.—"Uniform bright brown, darker along the dorsal line; nose, upper lip, and forehead, with two inches of the end of the tail black-brown; mere edge of upper lip and whole of lower jaw hoary; a short longitudinal white stripe occasionally on the front of the neck, and some vague spots of the same laterally, the signs, I suspect, of immaturity; feet frequently darker than the body or dusky brown; whiskers dark; fur close, glossy and soft, of two sorts, or fine hair and soft wool, the latter and the hair basally of dusky hue, but the hair externally bright brown; head, ears, and limbs more closely clad than the body, tail more laxly, tapering to the point."—*Hodgson*.

SIZE.—Head and body about 12 inches; tail, 6 inches.

Jerdon calls this the Himalayan Weasel, but I have preferred to translate Hodgson's name, which, I confess, puzzled me for some time till I found out there was a Hemachal range in Thibet.

No. 181. MUSTELA (GYMNOPUS: *Gray*) KATHIAH.

The Yellow-bellied Weasel (*Jerdon's No.* 98).

NATIVE NAME.—*Kathia-nyal*, Nepalese.

HABITAT.—Nepal, Bhotan.

DESCRIPTION.—Dark brown; upper lip, chin, throat, chest, underside of body and front of thighs, bright yellow; tail dark brown, shorter than the body and head, tapering, and of the same colour to the tip; the soles of the hind feet bald; pads well developed, exposed.

SIZE.—Head and body, 10 inches; tail, 5 inches.

Hodgson states that a horribly offensive yellowish-grey fluid exudes from two subcaudal glands. He says that the Nepalese highly prize this little animal for its services in ridding houses of rats. It is easily tamed, and such is the dread of it common to all murine animals that not one will approach a house wherein it is domiciled. Rats and mice seem to have an instinctive sense of its hostility to them, so much so that when it is introduced into a house they are observed to hurry away in all directions, being apprised, no doubt, of its presence by the peculiar odour it emits. Its ferocity and courage are made subservient to the amusement of the rich, who train it to attack large fowls, geese, and even goats and sheep. It seizes these by the great artery of the neck, and does not quit its hold till the victim sinks exhausted from the loss of blood—a cruel pastime which one could only expect of a barbarous people.

No. 182. MUSTELA (GYMNOPUS: *Gray*) STRIGIDORSA.

The Striped Weasel (*Jerdon's No.* 99).

HABITAT.—Sikim.

DESCRIPTION.—Dark chestnut-brown, with a narrow streak of long yellow hairs down the back; edge of upper lip, chin, throat, chest, and a narrow stripe down the centre of the belly, yellow, or yellowish-white.

SIZE.—Head and body, 12 inches; tail, 5½ inches without the hair, 6½ inches with it.

This is similar to the last, but is slightly larger, and distinguishable by the dorsal stripe.

No. 183. MUSTELA ERMINEA.

The Ermine or Stoat.

HABITAT.—Europe, America and Asia (the Himalayas, Nepal, Thibet, Afghanistan).

DESCRIPTION.—Brown above; upper lip, chin, and lower surface of body, inside of limbs and feet yellowish-white; tail brown, with a black tip. In winter the whole body changes to a yellowish-white, with the exception of the black tip of the tail.

SIZE.—Head and body, about 10 inches; tail, 4½ inches.

This is about the best known in a general way from its fur being used as part of the insignia of royalty. The fur however only becomes valuable after it has completed its winter change. How this is done was for a long time a subject of speculation and inquiry. It is, however, now proved that it is according to season that the mode of alteration is effected. In spring the new hairs are brown, replacing the white ones of winter; in autumn the existing brown hairs turn white. Mr. Bell, who gave the subject his careful consideration, says that in Ross's first Polar expedition, a Hudson's Bay lemming (*Myodes*) was exposed in its summer coat to a temperature of 30° below zero. Next morning the fur on the cheeks and a patch on each shoulder had become perfectly white; at the end of the week the winter change was complete, with the exception of a dark band across the shoulder and a dorsal stripe.

Hodgson remarks that the Ermine is common in Thibet, where the skins enter largely into the peltry trade with China.

In one year 187,000 skins were imported into England.

No. 184. MUSTELA (VISON: *Gray*) CANIGULA.

The Hoary Red-necked Weasel.

HABITAT.—Nepal hills, Thibet.

DESCRIPTION.—Pale reddish-brown, scarcely paler beneath; face,

chin, throat, sides of neck and chest white; tail half as long as body and head, concolorous with the back; feet whitish. Sometimes chest brown and white mottled, according to Gray. Hodgson, who discovered the animal, writes: "Colour throughout cinnamon red without black tip to the tail, but the chaffron and entire head and neck below hoary."

SIZE.—15½ inches; tail without hair 7½ inches, with hair 9½ inches.

No. 185. MUSTELA STOLICZKANA.

HABITAT.—Yarkand.

DESCRIPTION.—Colour pale sandy brown above; hairs light at base, white below; tail concolorous with back; small white spot close to anterior angle of each eye; a sandy spot behind the gape; feet whitish.

SIZE.—Head and body, 12·2; tail, 3 inches, including hair.

No. 186. MUSTELA (VISON) SIBIRICA.

HABITAT.—Himalayas (Thibet?); Afghanistan (Candahar).

DESCRIPTION.—Pale brown; head blackish, varied; spot on each side of nose, on upper and lower lips and front of chin, white; tail end pale brown like back, varies; throat more or less white.

This Weasel, described first by Pallas ('Specil Zool.' xiv. t. 4, f. 1.) was obtained in Candahar by Captain T. Hutton, who describes it in the 'Bengal Asiatic Society's Journal,' vol. xiv. pp. 346 to 352.

No. 187. MUSTELA ALPINA.

The Alpine Weasel.

HABITAT.—Said to be found in Thibet, otherwise an inhabitant of the Altai mountains.

DESCRIPTION.—Pale yellow brown; upper lip, chin, and underneath yellowish-white; head varied with black-tipped hairs; tail cylindrical, unicolour, not so long as head and body.—*Gray.*

No. 188. MUSTELA HODGSONI.

HABITAT.—Himalaya, Afghanistan.

DESCRIPTION.—Fur yellowish-brown, paler beneath; upper part and side of head much darker; face, chin, and throat varied with white; tail long, and bushy towards the end.

No. 189. MUSTELA (VISON) HORSFIELDI.

HABITAT.—Bhotan.

DESCRIPTION.—Uniform dark blackish-brown, very little paler beneath; middle of front of chin and lower lip white; whiskers black; tail slender, blackish at tip, half the length of head and body.

No. 190. MUSTELA (GYMNOPUS) NUDIPES.

Gymnopus leucocephalus of Gray.

HABITAT.—Borneo, Sumatra, Java, but possibly Tenasserim.

DESCRIPTION.—Golden fulvous with white head.

As so many Malayan animals are found on the confines of Burmah, and even extending into Assam, it is probable that this species may be discovered in Tenasserim.

GENUS PUTORIUS—THE POLE-CAT.

This is a larger animal than the weasel, and in form more resembles the marten, except in the shortness of its tail; the body is stouter and the neck shorter than in *Mustela;* the head is short and ovate; the feet generally hairy, and the space between the pads very much so; the under side of the body is blackish; the fur is made up of two kinds, the shorter is woolly and lighter coloured than the longer, which is dark and shining.

The disgusting smell of the common Pole-cat (*Putorius fœtidus*) is well known, and has become proverbial. In my county, as well as in many parts of England, the popular name is "foumart," which is said to be derived from "foul marten." The foumart is the special abhorrence of the game-keeper; it does more damage amongst game and poultry than any of the other *Mustelidæ*, and consequently greater pains are taken to trap and shoot it, in fact, so much so that I wonder that the animal is not now extinct in the British Isles. Professor Parker writes: "It has been known to kill as many as sixteen turkeys in a single night; and indeed it seems to be a point of honour with this bloodthirsty little creature to kill everything it can overpower, and to leave no survivors on its battle-fields." According to Bell, a female Pole-cat, which was tracked to her nest, was found to have laid up in a side hole a store of food consisting of forty frogs and two toads, all bitten through the brain, so that, though capable of living for some time, they were deprived of the power of escape. Now, this is a most wonderful instance of instinct bordering upon reason. Only the Reptilia can exist for any length of time after injury to the brain; to any of the

smaller mammalia such a process as that adopted by the Pole-cat, would have resulted in instant death and speedy decomposition.

The Ferret (*Putorius furo*) is a domesticated variety of the Pole-cat, reputed to be of African origin. Certain it is that it cannot stand extreme cold like its wild cousin, and an English winter is fatal to it if not properly looked after. It inter-breeds with the Pole-cat.

Ferrets are not safe pets in houses where there are young children. Cases have been known of their attacking infants in the cradle, and severely lacerating them.

They are chiefly used for killing rats and driving rabbits out of burrows; in the latter case they are muzzled. As pets they are stupid, and show but little attachment. Forbearance as regards making its teeth meet in your fingers is, I think, the utmost you can expect in return for kindness to a ferret, and that is something, considering what a sanguinary little beast it is.

No. 191. PUTORIUS LARVATUS, *vel* TIBETANUS.

Black-faced Thibetan Pole-cat.

HABITAT.—Utsang in Thibet, also Ladakh.

DESCRIPTION.—"Tail one-third of entire length; soles clad; fur long; above and laterally sordid fulvous, deeply shaded on the back with black; below from throat backwards, with the whole limbs and tail, black; head pale, with a dark mask over the face."—*Hodgson.*

SIZE.—Head and body, 14 inches; tail, 6 inches, with hair 7 inches; palma, $1\frac{3}{4}$; planta, $2\frac{3}{8}$.

This animal, according to Gray, is synonymous with the Siberian *Putorius Eversmannii*, although the sudden contraction of the brain case in front, behind the orbit, mentioned of this species, is not perceptible in the illustration given by Hodgson of the skull of this Thibetan specimen. Horsfield, in his catalogue, states that the second specimen obtained by Captain R. Strachey in Ladakh, north of Kumaon, agreed in external character.

In some respects it is similar to the European Pole-cat, but as yet little is known of its habits.

No. 192. PUTORIUS DAVIDIANUS.

HABITAT.—Moupin in Thibet.

DESCRIPTION.—Uniform fulvous brown, yellower under the throat; upper lip and round nostrils to corner of the eye white, darker on nose and forehead.

SIZE.—Head and body about $11\frac{1}{2}$ inches; tail, $6\frac{1}{2}$ inches.

This is one of the specimens collected by the Abbé David, after whom it is named. A fuller description of it will be found in Milne-Edwards's 'Recherches sur les Mammifères,' page 343. There is also a plate of the animal in the volume of illustrations.

No. 193. PUTORIUS ASTUTUS.

HABITAT.—Thibet.

DESCRIPTION.—About the size of Ermine, but with a longer tail. Colour brown, the white of the chest tinted with yellow; tail uniform in colour, darker on head.

SIZE.—Head and body, 10 inches; tail, $4\frac{1}{2}$ inches.

This is also described and figured by Milne-Edwards.

No. 194. PUTORIUS MOUPINENSIS.

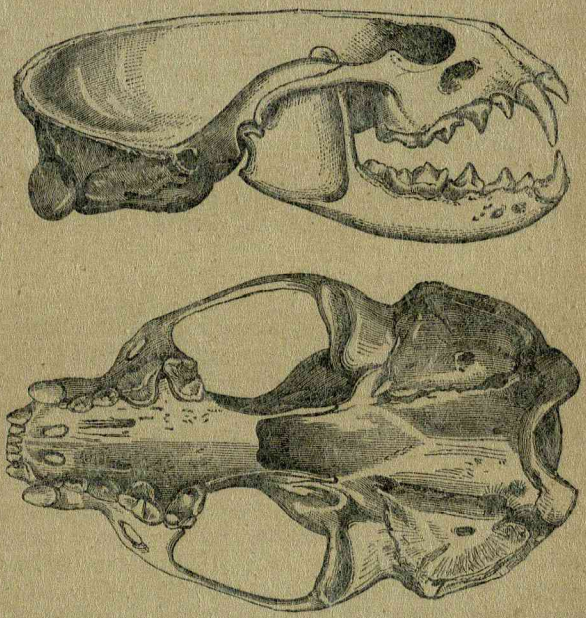
HABITAT.—Thibet.

DESCRIPTION.—Reddish-brown, white under the chin, and then again a patch on the chest.

LUTRIDÆ—THE OTTERS.

We now come to the third group of the musteline animals, the most aquatic of all the Fissipedia—the *Lutridæ* or Otters—of which there are two great divisions, the common Otters (*Lutra*) and the Sea Otters, (*Enhydra*). With the latter, a most interesting animal in all its ways, as well as most valuable on account of its fur, we have nothing to do. I am not aware that it is found in the tropics, but is a denizen of the North Pacific. Of *Lutra* we have several species in two genera. Dr. Gray has divided the Otters into no less than nine genera on three characteristics, the tail, feet, and muzzle, but these have been held open to objection. The classification most to be depended upon is the division of the tribe into long-clawed Otters (*Lutra*), and short or rudimentary-clawed Otters (*Aonyx*). The characteristics of the skulls confirm this arrangement, as the short-clawed Otters are distinguishable from the others by a shorter and more globose cranium and larger molars, and, as Dr. Anderson says, "the inner portion of the last molar being the largest part of the tooth, while in *Lutra* the outer exceeds the inner half; the almost general absence of the first upper pre-molar; and the rudimentary claws, which are associated with much more feebly-developed finger and toe bones, which are much tapered to a point, while in *Lutra* these bones are strong and well developed." Gray has separated a genus, which he called *Pteronura*, on account of a flattened tail arising from a longitudinal ridge on each side, but this flattening of the tail is common to all the genera more or less.

All the Otters, though active on land, are still only thoroughly at home in the water, and they are therefore specially constituted for such a mode of life. They have an elongated flattened form; webbed feet with short claws; compressed and tapering tail; dense fur of two kinds, one of long brown shining hairs; the under fur short and fine, impervious to wet, and well adapted for keeping an equality of temperature; the skull is peculiar, the brain case being very long, and compressed from above downwards; the facial portion forms only about one-fourth of the



Otter's skull (side and under view).

extreme length; the teeth are strong and sharp; the upper flesh tooth very large.

Dental formula: Inc., $\frac{3-3}{3-3}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{4-4}{3-3}$; molars, $\frac{1-1}{2-2}$.

Jerdon states that the otter has a nictitating membrane or additional semi-transparent eyelid, similar to that in the eyes of birds, which he supposes is a defence to them under water; but I have not noticed this myself, and have failed to discover it in the writings of others. I should think that the vision of the animal under water would not require

obscuring by a semi-transparent membrane, which none of the marine carnivora possess, though their eyes are somewhat formed for seeing better under water than when exposed to the full light above. Some idea of the rapidity of these animals in the water may be conceived when we think that their food is almost exclusively fish, of which they sometimes kill more than they can eat. They reside in burrows, making the entrance under water, and working upwards, making a small hole for the ventilation of their chamber. The female has about four or five young ones at a time, after a period of gestation of about nine weeks, and the mother very soon drives them forth to shift for themselves in the water.

For a pretty picture of young otters at play in the water, nothing could be better than the following description from Kingsley's 'Water Babies':—

"Suddenly Tom heard the strangest noise up the stream—cooing, grunting, and whining, and squeaking, as if you had put into a bag two stock-doves, nine mice, three guinea-pigs, and a blind puppy, and left them there to settle themselves and make music. He looked up the water, and there he saw a sight as strange as the noise: a great ball rolling over and over down the stream, seeming one moment of soft brown fur; and the next of shining glass, and yet it was not a ball, for sometimes it broke up and streamed away in pieces, and then it joined again; and all the while the noise came out of it louder and louder. Tom asked the dragon-fly what it could be: but of course with his short sight he could not even see it, though it was not ten yards away. So he took the neatest little header into the water, and started off to see for himself; and when he came near, the ball turned out to be four or five beautiful creatures, many times larger than Tom, who were swimming about, and rolling, and diving, and twisting, and wrestling, and cuddling, and kissing, and biting, and scratching, in the most charming fashion that ever was seen. And if you don't believe me you may go to the Zoological Gardens (for I am afraid you won't see it nearer, unless, perhaps, you get up at five in the morning, and go down to Cordery's Moor, and watch by the great withy pollard which hangs over the back-water, where the otters breed sometimes), and then say if otters at play in the water are not the merriest, lithest, gracefullest creatures you ever saw."

Professor Parker, who also notices Kingsley's description,* states that the Canadian otter has a peculiar habit in winter of sliding down ridges of snow, apparently for amusement. It, with its companions, scambles up a high ridge, and then, lying down flat, glides headforemost down the declivity, sometimes for a distance of twenty yards.

* In fact it was his quotation that induced me to buy a copy of that most charming little book, which I recommend every one to read.—R. A. S.

"This sport they continue apparently with the keenest enjoyment, until fatigue or hunger induces them to desist."

The following are the Indian species; *Lutra nair*, *L. simung vel monticola*, *L. Ellioti*, and *L. aurobrunnea* of the long-clawed family, and *Aonyx leptonyx* of the short-clawed.

No. 195. LUTRA NAIR.

The Common Indian Otter (Jerdon's No. 100).

NATIVE NAMES.—*Ud* or *Ood*, *Ood-bilao*, *Panikutta*, Hindi; *Nir-nai*, Canarese; *Neeru-kuka*, Telegu; *Jal-manjer*, Mahratti.

HABITAT.—India generally, Burmah and Ceylon.

Lutra nair.

DESCRIPTION.—Hair more or less brown above, sometimes with a chestnut hue, sometimes grizzled, or with a tinge of dun; yellowish-white, or with a fulvescent tinged white below; the throat, upper lip, and sides of head are nearly white; the line of separation of upper and lower parts not very distinctly marked. Some have whitish paws.

SIZE.—Head and body, 29 to 30 inches; tail about 17 inches.

This otter, which is synonymous with *L. Indica*, *L. Chinensis* and Hodgson's *L. Tarayensis*, is well known throughout India, and indeed far beyond Indian limits. They are generally found in secluded spots, in parties of about half a dozen hunting in concert. The young ones are easily tamed, and become greatly attached if kindly treated. I had one for some time. Jerdon tells a curious story of one he had, and which used to follow him in his walks. He says: "As it grew older it took to going about by itself, and one day found its way to the bazaar and seized a large fish from a moplah. When resisted, it showed

such fight that the rightful owner was fain to drop it. Afterwards it took regularly to this highway style of living, and I had on several occasions to pay for my pet's dinner rather more than was necessary, so I resolved to get rid of it. I put it in a closed box, and, having kept it without food for some time, I conveyed it myself in a boat some seven or eight miles off, up some of the numerous back-waters on this coast. I then liberated it, and, when it had wandered out of sight in some inundated paddy-fields, I returned by boat by a different route. That same evening, about nine whilst in the town about one and a-half miles from my own house, witnessing some of the ceremonials connected with the Mohurrum festival, the otter entered the temporary shed, walked across the floor, and came and lay down at my feet!" It is to be hoped Dr. Jerdon did not turn him adrift again; such wonderful sagacity and attachment one could only expect in a dog.

McMaster gives the following interesting account of otters hunting on the Chilka Lake: "Late one morning I saw a party, at least six in number, leave an island on the Chilka Lake and swim out, apparently to fish their way to another island, or the mainland, either at least two miles off. I followed them for more than half the distance in a small canoe. They worked most systematically in a semicircle, with intervals of about fifty yards between each, having, I suppose, a large shoal of fish in the centre, for every now and then an otter would disappear, and generally, when it was again seen, it was well inside the semicircle with a fish in its jaws, caught more for pleasure than for profit, as the fish, as far as I could see, were always left behind untouched beyond a single bite. I picked up several of these fish, which, as far as I can recollect, were all mullet." Kingsley notices this. The old otter tells Tom: "We catch them, but we disdain to eat them all; we just bite out their soft throats and suck their sweet juice—oh, so good!" (and she licked her wicked lips)—"and then throw them away, and go and catch another."

General McMaster also quotes from a letter by "W. C. R." in the *Field* about the end of 1868, which gives a very curious incident of a crocodile stealing up to a pack of otters fishing, and got within thirty yards; "but no sooner was the water broken by the hideous head of the reptile, than an otter, which evidently was stationed on the opposite bank as a sentinel, sounded the alarm by a whistling sort of sound. In an instant those in the water rushed to the bank and disappeared among the jungle, no doubt much to the disgust of the *mugger*."

I have not heard any one allude to the offensive glands of the Indian otter, but I remember once dissecting one and incautiously cutting into one of these glands, situated, I think, near the tail. It is now over twenty years ago, so I cannot speak with authority, but I remember the abominable smell, which quite put a stop to my researches at the time.

This otter is trained in some parts of India, in the Jessore district and Sunderbunds of Bengal, to drive fish into nets. In China a species there is driven into the water with a cord round its waist, which is hauled in when the animal has caught a fish.

No. 196. LUTRA MONTICOLA *vel* SIMUNG.

(*Jerdon's No.* 101).

HABITAT.—Nepal, Sumatra, and Borneo.

DESCRIPTION.—"The colour is more rufous umber-brown than *L. nair*, and does not exhibit any tendency to grizzling, and the under surface is only somewhat hoary, well washed with brownish; the chin and edge of the lips are whitish; and the silvery hoary on the sides of the head, on the throat, and on the under surface of the neck and of the chest is marked; the tail above and below is concolorous with the trunk. The length of the skeleton of an adult female, measured from the tip of the premaxillaries to the end of the sacral vertebræ, is 23·25, and the tail measures 17·75 inches" (*Anderson*). Of the Sumatran specimen the first notice was published in 1785 in the first edition of Marsden's 'History of Sumatra.' This otter is larger than the common Indian one, the skull of a female, as given by Dr. Anderson, exceeding in all points that of male of *Lutra nair*.

Jerdon has this as *Lutra vulgaris*, which is the common English otter, but there is a difference in the skull.

No. 197. LUTRA ELLIOTI.

HABITAT.—Southern Mahratta country.

DESCRIPTION.—The colouring is the same as the last, only a little darker; the distribution of the silvery white is the same; the muzzle is however more depressed than in the last species, and it differs from *L. nair* by a broader, more arched head, and shorter muzzle.

Dr. Anderson, who distinguishes it by the feature of its skull from the two preceding species, says: "It may be that this otter has a north-westerly distribution, and that it is the species which occurs in the lake at Mount Abu in Rajputana, and also in Sindh and in the Indus.

No. 198. LUTRA AUROBRUNNEA.

HABITAT.—Nepal.

DESCRIPTION.—Fur of a rich ferruginous brown colour, the upper surface of the head being a deeper brown than the back; the nose is bare; the ears are small and pointed posteriorily. All the strong bristles of the moustache, eyes, cheeks, and chin, are dark brown; claws as in *Lutra* (*Anderson*). Hodgson says it has a more vermiform

body than the rest of Indian otters; tail less than two thirds of the body; nails and toes feebly developed (whence it is classed by Gray in the next genus); fur long and rough, rich chestnut-brown above, golden red below and on the extremities.

SIZE.—Head and body, 20 to 22 inches; tail, 12 to 13 inches.

GENUS AONYX—CLAWLESS OTTERS.

Muzzle bald, oblong; skull broad, depressed, shorter and more globose than in *Lutra*; the molars larger than in the last genus; flesh tooth larger, and with a large internal lobe; first upper premolar generally absent; feet oblong, elongate; toes slender and tapering; claws rudimentary.

No. 199. AONYX LEPTONYX.

The Clawless Otter (*Jerdon's No.* 102).

NATIVE NAMES.—*Chusam*, Bhotia; *Suriam*, Lepcha.

HABITAT.—Throughout the Himalayas, also in Lower Bengal and in Burmah.

DESCRIPTION.—"Above earthy brown or chestnut brown; lips, sides of head, chin, throat, and upper part of breast white, tinged with yellowish-grey. In young individuals the white of the lower parts less distinct, sometimes very pale brownish."—*Jerdon.*

SIZE.—Head and body, 24 inches; tail, 13.

Mason speaks of this species as common in Burmah, and McMaster mentions his having seen in the Sitang River a colony of white-throated otters smaller than *L. nair*, though larger than *L. aurobrunnea*, but he did not secure specimens.

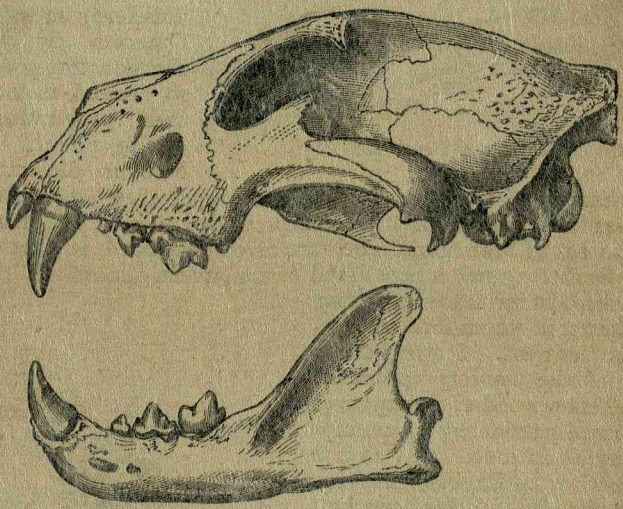
ÆLUROIDEA.

This section includes the Cat family (*Felidæ*); the Hyænas (*Hyænidæ*); two families unknown in India, viz. the *Cryptoproctidæ* and the *Protelidæ*; and the Civet family (*Viverridæ*).

FELIDÆ—THE CAT FAMILY.

This family contains the typical carnivores. There is in them combined the greatest power of destruction, accompanied by the simplest mechanism for producing it. All complications of dentition and digestion disappear. Here are the few scissor-like teeth with the enormous canines, the latter for holding and piercing the life out of their prey, the former for chopping up the flesh into suitable morsels for swallowing. Then the stomach is a simple sac, undivided into compart-

ments, and the intestine is short, not more than three times the length of the body, instead of being some twenty times longer, as in some herbivores. This family has the smallest number of molars, a class of tooth which would indeed be useless, for the construction of the feline jaw precludes the possibility of grinding, and therefore a flat-crowned tuberculous tooth would be out of place. As I have before described it, the jaw of a tiger is incapable of lateral motion. The condyle of the lower jaw is so broad, and fits so accurately into its socket, the glenoid cavity, that there can be no departure from the up and down scissor-like action. The true Cats have, therefore, only one molar on each side of each jaw; those in the upper jaw being merely rudimentary, and placed almost at



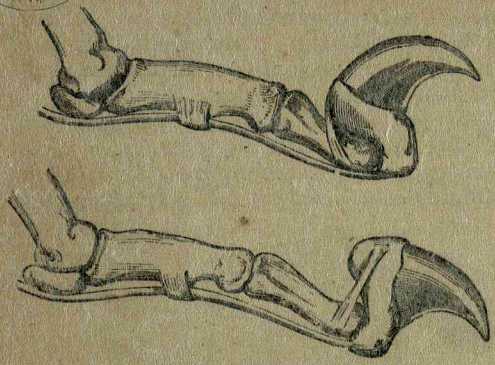
Skull of Tiger (side view).

right angles to the rest of the teeth, and seem apparently of little use; those of the lower jaw are large and trenchant, cutting against the edge of the third upper premolar.

It may interest my readers to know which are premolars and which are molars. This can be decided only by dissection of the jaw of a young animal. True molars only appear as the animal approaches the adult stage. They are never shed, as are all the rest of the teeth, commonly called milk teeth. The deciduous or milk teeth are the incisors, canines, and premolars; they drop out and are replaced, and behind the last premolar comes up the permanent molar.

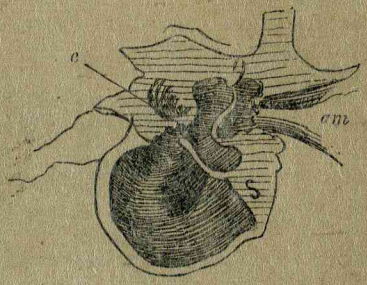
Another peculiar feature of the Cat family is the power of sheathing

talons. Claws to a cat are of as great importance to him in the securing of his prey as are his teeth. The badger is a digger, Hodge, who carries his mattock on his shoulder; but the feline is the free-lance whose sword must be kept keen in its scabbard, so by a peculiar arrangement of muscles the points of the claws are kept off the ground, while the animal treads noiselessly on soft pads. Otherwise by constant abrasion they would get so blunted as to fail in their penetrating and seizing power. I give here an illustration of the mechanism of the feline claw. In the upper sketch the claw is retracted or sheathed; in the lower it is protruded as in the act of striking.



Tendons of Tiger's toe.

The senses of hearing and smell are much developed, and the bulb of the ear (*bulla tympani*) is here found of the largest dimensions. I have once before alluded to this in writing of the bears, in whom this arrangement is deficient. I give here a section of the auditory apparatus. I do not know whether the engraver has effectually rendered my attempt at conveying an idea, based as it is on dissections by Professor Flower; but if he has failed I think the fault lies in the shakiness of my hand in attempting the fine shading after nearly breaking a saw and losing my temper over a very tough old skull which I divided before commencing my illustration. The great cavity is the *bulla tympani* or bulb of the ear; *a m* is the *auditory meatus* or external hole of the ear. On looking into a dry skull the passage seems to be of no great depth, nor can an instrument be passed directly from the outside into the great tympanic cavity, the hindrance being a wall of bone, *s*, the *septum* which divides the *bulla* into two distinct chambers, the reason for which is not very clear, except that one may suppose it to be in some measure for acoustic purposes, as all animals



with this development are quick of hearing. The communication between the two chambers lies in a narrow slit over the *septum*, the Eustachian tube, *e*, being on the outside of the *septum* and between it and the tympanum or ear drum, *t*.

The above are the chief characteristics of the family. For the rest we may notice that they have but a rudimentary clavicle imbedded among the muscles; the limbs are comparatively short, but immensely muscular; the body lithe and active; the foot-fall noiseless; the tongue armed with rough papillæ, which enables them to rasp the flesh off bones, and their vision is adapted for both night and day.

None of them are gregarious, as in the case of dogs and wolves. One hears sometimes of a limited number of lions and tigers being seen together, but in most cases they belong to one family, of which the junior members have not been "turned off on their own hook" as yet.

No. 200. FELIS LEO.

The Lion (*Jerdon's No.* 103).

NATIVE NAMES.—*Sherubbar, Singh, Untthia-bagh.*

HABITAT.—Guzerat and Central India.

DESCRIPTION.—The Lion is almost too well known to need description, and there is little difference between the Asiatic and African animal. It may, however, be generally described as being distinguished from other Cats by its uniform tawny colour, flatter skull, which gives it a more dog-like appearance, the shaggy mane of the male, and by the tufted tail of both sexes.

Felis leo (Indian variety).

SIZE.—From nose to insertion of tail, 6 to 6½ feet; tail, 2½ to 3 feet; height, 3½ feet.

The weight of one measured by Captain Smee, 8 feet 9½ inches, was (excluding the entrails) thirty-five stone. This must be the one alluded to by Jerdon, but he does not state the extraction of the viscera, which would add somewhat to the weight.

Young lions when born are invariably spotted; and Professor Parker states that there were in the Zoological Gardens in 1877 three lions which were born in the menagerie about ten years previously, and which showed "indistinct, though perfectly evident, spots of a slightly darker tawny than the general ground-tint on the belly and flanks." He adds: "This is also the case with the puma, and it looks very much as if all the great Cats were descended from a spotted ancestor." The more dog-like head of the lion is well known to all who have studied the physiognomy of the Cats, and I have not only noticed it in drawing the animal, but have seen it alluded to in the writings of others. It was not, however, till lately that I had an opportunity of comparing the skulls of the lion and tiger in the Calcutta Museum, and I am indebted to Mr. Cockburn of the museum, not only for the trouble he took in getting out the various skulls, but for his assistance in pointing out certain peculiarities known to him, but of which I was at the time ignorant. That the skull of the lion is flatter than, and wants the bold curve of, those of the tiger, leopard and jaguar, is a well-known fact, but what Mr. Cockburn pointed out to me was the difference in the maxillary and nasal sutures of the face. A glance at two skulls placed side by side would show at once what I mean. It would be seen that the nasal bones of the tiger run up higher than those of the lion, the apices of whose nasal and maxillary sutures are on a level. On leaving the museum I compared the tiger skulls in my possession with accurate anatomical drawings which I have of the osteology of the lion, and the result was the same. It is said that there is also a difference in the infra-orbital foramen of the two animals, but this I have failed to detect as yet, though asserted by De Blainville in his magnificent work on osteology ('Ostéographie').

From all that has been written of the African and Indian lions I should say that the tiger was the more formidable of the two, as he is, I believe, superior in size. About twenty-two years ago my attention was drawn to this subject by the perusal of Mr. Blyth's article on the *Felidæ* in the old *India Sporting Review* of 1856–57. If I am not mistaken there was at that time (1861) a fine skeleton of a lion in the museum, as well as those of several tigers, which I measured. I had afterwards opportunities of observing and comparing skeletons of the two animals in various museums in Europe, though not in my own country, for my stay in England on each occasion of furlough was brief, and in almost every instance I found the tiger the larger of the two. The book in which I recorded my observations, and which also contained a number of microscopic drawings of marine infusoria, collected during a five months' voyage, was afterwards lost, so I cannot now refer to my notes.

I believe there was once a case of a fair fight between a well-matched lion and tiger in a menagerie (Edmonds's, I think). The

two, by the breaking of a partition, got together, and could not be separated. The duel resulted in the victory of the tiger, who killed his opponent.

The lion seems to be dying out in India, and it is now probably confined only to Guzerat and Cutch. I have not been an attentive reader of sporting magazines of late years, and therefore I cannot call to mind any recent accounts of lion-killing in India, if any such have been recorded. At the commencement of this century lions were to be found in the North-West and in Central India, including the tract of country now termed the Central Provinces. In 1847 or 1848 a lioness was killed by a native shikari in the Dumoh district. Dr. Spry, in his 'Modern India,' states that, when at Saugor in the Central Provinces in 1837, the skin of a full-grown male lion was brought to him, which had been shot by natives in the neighbourhood. He also mentions another lioness shot at Rhylee in the Dumoh district in 1834, of which he saw the skin. Jerdon says that tolerably authentic intelligence was received of the presence of lions near Saugor in 1856; and whilst at Seonee, within the years 1857 to 1864, I frequently heard the native shikaris speak of having seen a tiger *without stripes*, which may have been of the present species. The indistinct spots on the lion's skin (especially of young lions), to which I have before alluded, were noticed in the skin of the lioness shot at Dumoh in 1847. The writer says: "when you place it in the sun and look sideways at it, some very faint spots (the size of a shilling or so) are to be seen along the belly."

Lions pair off at each season, and for the time they are together they show great attachment to each other, but the male has to fight for his spouse, who bestows herself on the victor. They then live together till the young are able to shift for themselves. The lioness goes with young about fifteen or sixteen weeks, and produces from two to six at a litter. But there is great mortality among young lions, especially about the time when they are developing their canine teeth. This has been noticed in menageries, confirming a common Arab assertion. In the London Zoological Gardens, during the last twenty years, there has been much mortality among the lion cubs by a malformation of the palate. It is a curious fact that lions breed more readily in travelling menageries than in stationary ones.

No. 201. FELIS TIGRIS.

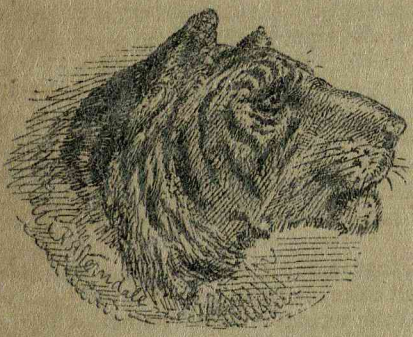
The Tiger (*Jerdon's No* 104).

NATIVE NAME.—*Bagh*, *Sher*, Hindi; *Sela-vagh*, *Go-vagh*, Bengali; *Wuhag*, Mahrathi; *Nahar* in Bundelkund and Central India; *Tut* of the hill people of Bhagulpore; *Nongya-chor* in Gorukpore; *Puli* in Telegu

and Tamil, also *Pedda-pulli* in Telegu; *Parain-pulli* in Malabar; *Huli* in Canarese; *Tagh* in Tibet; *Suhtong* in Lepcha; *Tukh* in Bhotia.

These names are according to Jerdon. *Bagh* and *Sher* all Indian sportsmen are familiar with. The Gonds of the Central Provinces call it *Pullial*, which has an affinity with the southern dialects.

HABITAT.—The tiger, as far as we are concerned, is known throughout the Indian peninsula and away down the eastern countries to the Malayan archipelago. In Ceylon it is not found, but it extends to the Himalayas, and ranges up to heights of 6000 to 8000 feet. Generally speaking it is confined to Asia, but in that continent it has a wide distribution. It has been found as far north as the island of Saghalien, which is bisected by N. L. 50°. This is its extreme north-eastern limit, the Caspian Sea being its westerly boundary. From parallel 50° downwards it is found in many parts of the highlands of central Asia.



DESCRIPTION.—A large heavy bodied Cat, much developed in the fore-quarters, with short, close hair of a bright rufous ground tint from every shade of pale yellow ochre to burnt sienna, with black stripes arranged irregularly and seldom in two individuals alike, the stripes being also irregular in form, from single streaks to loops and broad bands. In some the brows and cheeks are white, and in all the chin, throat, breast, and belly are pure white. All parts, however, whether white or rufous, are equally pervaded by the black stripes. The males have prolonged hairs extending from the ears round the cheeks, forming a ruff, or whiskers as they are sometimes called, although the true whiskers are the labial bristles. The pupil of the tiger's eye is round, and not vertical, as stated by Jerdon.

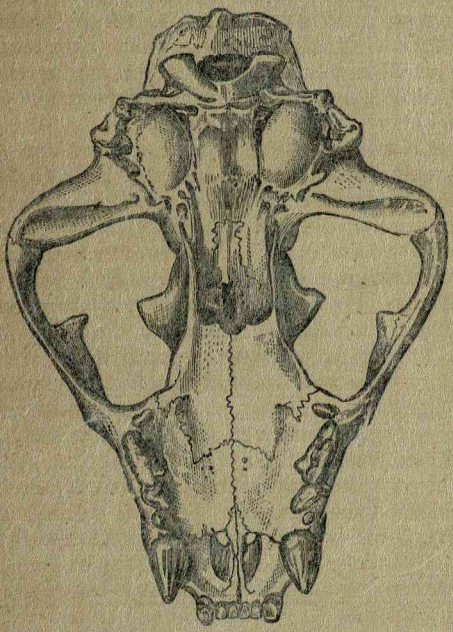
SIZE.—Here we come to a much-vexed question, on which there is much divergence of opinion, and the controversy will never be decided until sportsmen have adopted a more correct system of measurement. At present the universal plan is to measure the animal as it lies on the ground, taking the tape from the tip of the nose to the end of the tail. I will undertake that no two men will measure the same tiger with equal results if the body be at all disturbed between the two operations. If care be not taken to raise the head so as to bring the plane of the skull in a line with the vertebræ, the downward deflection will cause increased

measurement. Let any one try this on the next opportunity, or on the dead body of a cat. Care should be taken in measuring that the head be raised, so that the top of the skull be as much as possible in a line with the vertebræ. A stake should be then driven in at the nose and another close in at the root of the tail, and the measurement taken between the two stakes, and not round the curves. The tail, which is an unimportant matter, but which in the present system of measurement is a considerable factor, should be measured and noted separately. I am not a believer in tails (or tales), and have always considered that they should be excluded from measurements except as an addition. I spoke of this in 'Seonee' in the following terms: "If all tigers were measured honestly, a twelve-foot animal would never be heard of. All your big fellows are measured from stretched skins, and are as exaggerated as are the accounts of the dangers incurred in killing them—at least in many cases. But even the true method of measuring the unskinned animal is faulty; it is an apparent fact that a tail has very little to do with the worthiness of a creature, otherwise our bull-dogs would have their caudal appendages left in peace. Now every shikari knows that there may be a heavy tiger with a short tail and a light bodied one with a long tail. Yet the measurement of each would be equal, and give no criterion as to the size of the brute. Here's this tiger of yours; I call him a heavy one, twenty-eight inches round the fore-arm, and big in every way, yet his measurement does not sound large (it was 9 feet 10 inches), and had he six inches more tail he would gain immensely by it in reputation. The biggest panther I ever shot had a stump only six inches long; and according to the usual system of measuring he would have read as being a very small creature indeed." Tails do vary. Sir Walter Elliot was a very careful observer, and in his comparison of the two largest males and two largest females, killed between 1829 and 1833, out of 70 to 80 specimens, it will be seen that the largest animal in each sex had the shortest tail:—

——	Adult Male.		Adult Female.	
	ft. in.	ft. in.	ft. in.	ft. in.
Length of head and body	6 2	5 6	5 3½	5 2
Length of tail	3 1½	3 3	2 11	3 2
	9 3½	8 9	8 2½	8 4

Campbell, in his notes to 'The Old Forest-Ranger,' gives the dimensions of a tiger of 9 ft. 5 in. of which the tail was only 2 ft. 10 in. From the other detailed measurements it must have been an enormous tiger. The

number of caudal vertebræ in the tiger and lion should be twenty-six. I now regret that I did not carefully examine the osteology of all short-tailed tigers which I have come across, to see whether they had the full complement of vertebræ. The big tiger in the museum is short by the six terminal joints = three inches. This may have occurred during life, as in the case of the above-quoted panther; anyhow the tail should, I think, be thrown out of the calculation. Now as to the measurement of the head and body, I quite acknowledge that there must be a different standard for the sportsman and for the scientific naturalist. For the latter the only reliable data are derived from the bones. Bones cannot err. Except in very few abnormal conditions the whole skeleton is in *accurate* proportion, and it has lately struck me that from a certain measurement of the skull a true estimate might be formed of the length of the skeleton, and approximately the size of the animal over the muscles. I at first thought of taking the length of the skull by a craniometer, and seeing what portion of the total length to the posterior edge of the sacrum it would be, but I soon discarded the idea on account of the variation in the supra-occipital process.



Tiger's skull (under part).

I then took the palatal measurement, from the outer edge of the border in which the incisors are set to the anterior inside edge of the brain-hole, or foramen magnum, and I find that this standard is sufficiently accurate, and is 5·50 of the length taken from the tip of the premaxillaries to the end of the sacrum. Therefore the length of this portion of any tiger's skull multiplied by 5·50 will give the measurement of the head and body of the skeleton.

For the purpose of working out these figures I applied to all my sporting friends for measurements of their largest skulls, with a view to settling the question about tigers exceeding eleven feet. The museum possesses

the skeleton of a tiger which was considered one of the largest known, the cranial measurement of whose skull is 14·50 inches, but the Maharajah of Cooch Behar showed me one of his skulls which exceeded it, being 15 inches. Amongst others I wrote to Mr. J. Shillingford of Purneah, and he most kindly not only drew up for me a tabular statement of the dimensions of the finest skulls out of his magnificent collection, but sent down two for my inspection. Now in the long-waged war of opinion regarding the size of tigers I have always kept a reserved attitude, for if I have never myself killed, or have seen killed by others, a tiger exceeding ten feet, I felt that to be no reason for doubting the existence of tigers of eleven feet in length vouched for by men of equal and in some cases greater experience, although at the same time I did not approve of a system of measurement which left so much to conjecture.

There is much to be said on both sides, and, as much yet remains to be investigated, it is to be hoped that the search after the truth will be carried on in a judicial spirit. I have hitherto been ranged on the side of the moderate party; still I was bound to respect the opinion of Sir Joseph Fayrer, who, as not only as a sportsman but as an anatomist, was entitled to attention; and from my long personal acquaintance I should implicitly accept any statement made by him. Dr. Jerdon, whom I knew intimately, was not, I may safely assert, a great tiger shikari, and he based his opinion on evidence and with great caution. Mr. J. Shillingford, from whom I have received the greatest assistance in my recent investigations, and who has furnished me with much valuable information, is on the other hand the strenuous assertor of the existence of the eleven-foot tiger, and with the magnificent skulls before me, which he has sent down from Purneah, I cannot any longer doubt the size of the Bengal tiger, and that the animals to which they belonged were eleven feet, *measured sportsman fashion*—that is round the curves. The larger of the two skulls measures 15·25 inches taken between two squares, placed one at each end; a tape taken from the edge of the premaxillaries over the curve of the head gives 17·37 inches; the width across the zygomatic arches, 10·50.* The palatal measurement, which is the test I proposed for ascertaining the length of the skeleton, is 12·25, which would give 5 feet 7·37 inches; about $3\frac{3}{4}$ inches larger than the big skeleton in the Museum. This may seem very small for the body of an animal which is supposed to measure eleven feet, but I must remind my readers that the bones of the biggest tiger look very small when denuded of the muscles; and the present difficulty I have to contend with is how to strike the average rate for the allowance to be added to skeleton for muscles, the chief stumbling block being the system which has hitherto included the tail in the measurement. If all tigers had been measured as most other animals (except felines)

* At Mr. Shillingford's request, I made over this skull to the Calcutta Museum.

—i.e. head and body together, and then the tail separately—I might have had some more reliable data to go upon; but I hope in time to get some from such sportsmen as are interested in the subject. I have shown that the tail is not trustworthy as a proportional part of the total length; but from such calculations as I have been able to make from the very meagre materials on which I have to base them, I should allow one 2·50th part of the total length of skeleton for curves and muscles.

In addition to a careful study of De Blainville's 'Ostéographie,' where the bones are figured in large size to scale, I have made many careful measurements of skulls belonging to myself and friends, and also of the skulls and skeletons in the Calcutta Museum (for most willing and valuable assistance in which I am indebted to Mr. J. Cockburn, who, in order to test my calculations, went twice over the ground); and I have adopted the following formula as a tentative measure. I quite expect to be criticised, but if the crude idea can be improved on by others I shall be glad.

I now give a tabular statement of four out of many calculations made, but I must state that in fixing an arbitrary standard of 36 inches for tail, I have understated the mark, for the tails of most tigers exceed that by an inch or two, though, on the other hand, some are less.

Formula.—Measure from the tip of the premaxillaries or outer insertion of the front teeth (incisors) along the palate to the nearest inner edge of the foramen magnum. Multiply the result by 5·50. This will give the length of the skeleton, excluding the tail. Divide this result by 2·50, and add the quotient to the length for the proportionate amount of muscles and gain in curves. Add 36 inches for tail.

——	Palatal measurement multiplied by 5·50.	Add one 2·50th part of last for curves and muscles.	Total.	Total.	Total in feet and inches.		Remarks.
					ft.	in.	
Mr. Shillingford's tiger	67·37	26·94	36·00	130·31	10	10	Mr. S——'s tiger's tail was over 3 ft. 2 ins., which would make it 11 ft.
Big tiger in museum .	63·52	25·40	36·00	124·92	10	4¾	Nearly 10 ft. 5 in.
Maharajah of Cooch Behar's tiger	66·00	26·40	36·00	128·40	10	8·4	The Maharajah writes to me that it measured on the ground 9 ft. 11 in. See further on.
A medium-sized one of my own	55·75	23·10	36·00	116·85	9	8¾	

It will be seen that my calculation is considerably out in the Cooch Behar tiger, so I asked the Maharajah to tell me, from the appearance of the skull, whether the animal was young or old. He sent it over to me, and I have no hesitation in saying that it was that of a young tiger, who, in another year, might have put on the extra nine inches; the parietal sutures, which in the old tiger (as in Mr. Shillingford's specimens) are completely obliterated, are in this one almost open. It must be remembered that the bones of the skull do not grow in the same ratio to the others, and that they attain their full size before those of the rest of the body. Therefore it is only in the case of the adult that accurate results can be calculated upon. Probably I have not done wisely in selecting a portion of the skull as a standard—a bone of the body, such as a femur or humerus might be more reliable—but I was driven to it by circumstances. Sportsmen, as a rule, do not keep anything but the skull, and for general purposes it would have been of no use my giving as a test what no one could get hold of except in a museum.

I have always understood that the tiger of the plains grew to a greater size, that is in length, than the tiger of hilly country. I have never shot a tiger in Lower Bengal, therefore I cannot judge of the form of the beast, whether he be more lanky or not. If an eleven-foot Bengal tiger be anything like as robust in proportion as our Central Indian ones, I should say he was an enormous creature, but I believe the Central and Southern tiger to be the heavier one, and this is borne out by an illustration given by Mr. Shillingford in one of his able letters, which have called forth so much hostile criticism. He compares one of his largest with the measurement of a Southern India tiger :—

Locality of Tiger.	Length.	Girth of Chest.	Girth of Head.	Tail.	Round Fore-arm.	Height.	Total of feet and inches.
	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
Purneah . .	11 0	4 6	2 10	3 4	2 2	3 7	27 5
Southern India.	10 2	6 1	3 5	3 1	2 10	3 9	29 4

The shorter tiger has an advantage of nearly two feet in all-round measurement.

Sir Joseph Fayrer has also been called in question for his belief in twelve feet tigers, but what he says is reasonable enough. "The tiger should be measured from the nose along the spine to the tip of the tail, as he lies dead on the spot where he fell, before the skin is removed. *One that is ten feet by this measurement is large, and the full-grown male does not often exceed this*, though no doubt larger individuals (males) are

occasionally seen, and I have been informed by Indian sportsmen of reliability that they have seen and killed tigers over twelve feet in length." ('Royal Tiger of Bengal,' p. 29).

Sir Joseph Fayrer in a letter to *Nature*, June 27, 1878, brings forward the following evidence of large tigers shot by sportsmen whose names are well known in India.

Lieutenant-Colonel Boileau killed a tiger at Muteara in Oude, in 1861, over 12 feet; the skin when removed measured 13 feet 5 inches.

Sir George Yule has heard once of a 12-foot tiger fairly measured, but 11 feet odd inches is the largest he has killed, *and that twice or thrice.*

Colonel Ramsay (Commissioner) killed in Kumaon a tiger measuring 12 feet.

Sir Joseph Fayrer has seen and killed tigers over 10 feet, and one in Purneah 10 feet 8 inches, in 1869.

Colonel J. Sleeman does not remember having killed a tiger *over* 10 feet 6 inches in the skin.

Colonel J. MacDonald has killed one 10 feet 4 inches.

The Honourable R. Drummond, C.S., killed a tiger 11 feet 9 inches, measured before being skinned.

Colonel Shakespeare killed one 11 feet 8 inches.

However, conceding that all this proves that tigers do reach occasionally to eleven and even twelve feet, it does not take away from the fact that the average length is between nine and ten feet, and anything up to eleven feet is rare, and up to twelve feet still more so.*

VARIETIES OF THE TIGER.—It is universally acknowledged that there is but one species of tiger. There are, however, several marked varieties. The distinction between the Central Asian and the Indian tiger is unmistakable. The coat of the Indian animal is of smooth, short hair; that of the Northern one of a deep furry pelage, of a much richer appearance.

There is an idea which is also to be found stated as a fact in some works on natural history, that the Northern tiger is of a pale colour with few stripes, which arises from Swinhoe having so described some specimens from Northern China; but I have not found this to be confirmed in those skins from Central Asia which I have seen. Shortly before leaving London, in 1878, Mr. Charles Reuss, furrier, in Bond

* Since writing the above I have to thank "Meade Shell" for the measurements of the skull of a tiger 11 ft. 6 in. The palatal measurement is 12 inches, which, according to my formula, would give only 10 ft. 8 in.; but it must be remembered that I have allowed only 3 ft. for the tail, whereas such a tiger would probably have been from 3½ to 4 ft., which would quite bring it up to the length vouched for. The tail of a skeleton of a much smaller tiger in the museum measures 3 ft. 3½ in., which with skin and hair would certainly have been 3½ ft. Until sportsmen begin to measure bodies and tails separately it will, I fear, be a difficult matter to fix on any correct formula.—R. A. S. See Appendix C.

Street, showed me a beautiful skin with deep soft hair, abundantly striped on a rich burnt sienna ground, admirably relieved by the pure white of the lower parts. That light-coloured specimens are found is true, but I doubt whether they are more common than the others. Of the varieties in India it is more difficult to speak. Most sportsmen recognise two (some three)—the stout thick-set tiger of hilly country, and the long-bodied lankier one of the grass jungles in the plains. Such a division is in consonance with the ordinary laws of nature, which we also see carried out in the thick-set muscular forms of the human species in mountain tracts.

Some writers, however, go further, and attempt subdivisions more or less doubtful. I knew the late Captain J. Forsyth most intimately for years. We were in the same house for some time. I took an interest in his writings, and helped to illustrate his last work, and I can bear testimony to the general accuracy of his observations and the value of his book on the Highlands of Central India; but in some things he formed erroneous ideas, and his three divisions, based on the habits of the tiger, is, I think, open to objection, as tending to create an idea of at least two distinct varieties.

Native shikaris, he says, recognise two kinds—the *Lodhia Bagh* and the *Oontia Bagh* (which last I may remind my readers is one of the names of the lion). The former is the *game-killing* tiger, retired in his habits, living chiefly among the hills, retreating readily from man. "He is a light-made beast, very active and enduring, and from this, as well as his shyness, generally difficult to bring to bag."

I grant his shyness and comparative harmlessness (I once met one almost face to face)—and the nature of the ground he inhabits increases the difficulty in securing him—but I do not think he physically differs from his brother in the cattle districts. Mr. Sanderson says one of the largest tigers he had killed was a pure game-killer.

"The cattle-lifter again," says Forsyth, "is usually an older and heavier animal (called *Oontia Bagh*, from his faintly striped coat, resembling the colour of a camel), very fleshy and indisposed to severe exertion."

His third division is the man-eater. However, this is merely a classification on the habits of the same animal. I think most Central India sportsmen will agree with me when I say that many a young tiger is a cattle-eater, with a rich coloured hide, although it often happens that an old tiger of the first division, when he finds his powers for game failing by reason of age or increased bulk, transfers himself from the borders of the forest to the vicinity of grazing lands and villages, and he ultimately may come into the third division by becoming a man-eater. So that the *Lodhia* becomes the *Oontia* (for very old tigers become lighter in colour), and may end by being an *Adam-khor*, or man-eater. Tigers roam a great deal at times, and if in their

wanderings they come to a suitable locality with convenience of food and water, they abide there, provided there be no occupant with a prior claim and sufficient power to dispute the intrusion. We had ample proof of this at Seonee. Close to the station, that is, within a short ride, were several groups of hills which commanded the pasture lands of the town. Many a tiger has been killed there, the place of the slain one being occupied ere long by another. On the other hand, if a tiger be accommodated with lodgings to his liking, he will stay there for years, roaming a certain radius, but returning to his home; and it is the knowledge of this that so often enables the hunter to compass his destruction. As long therefore as there are human habitations, with their usual adjuncts of herds and flocks, within a dozen miles of the jungle tiger's haunts, so long there will always be the transition from the game-killer to the cattle-lifter and the man-eater. Colour and striping must also be thrown out of the question, for no two individuals of any variety agree, and the characteristics of shade and marking are common to all kinds. The only reliable data therefore are derived from measurements, and from these it may be proved that the grass-jungle tiger of Bengal, though the longer animal, is yet inferior in all round measurement and probably in weight to the tiger of hilly country —see Mr. Shillingford's comparison quoted by me above. Let also any one compare the following measurements of one given by Colonel Walter Campbell with a tiger of equal length shot in the grassy plains of Bengal :—

	ft.	in.
Length from point of nose to end of tail	9	5
Ditto of tail	2	10
Height from heel to shoulder	3	2
Extreme length from shoulder to point of toe	3	11
From elbow to point of toe	2	0
Girth of body just behind the shoulder	5	3
Ditto of forearm	2	7
Ditto of neck	3	0
Circumference of head	3	3

This is a remarkably short-tailed tiger. If the concurrence of evidence establishes the difference beyond doubt, then we may say that there are two varieties in India—the hill tiger, *Felis tigris, var. montanus;* and the other, inhabiting the alluvial plains of great rivers, *Felis tigris, var. fluviatilis.* Dr. Anderson says he has examined skulls and skins of those inhabiting the hill ranges of Yunnan, and can detect no difference from the ordinary Indian species.

The tigress goes with young for about fifteen weeks, and produces from two to five at a birth. I remember once seeing four perfectly formed cubs, which would have been born in a day or two, cut from a tigress shot by my brother-in-law Col. W. B. Thomson in the hills

adjoining the station of Seonee. I had got off an elephant, and, running up the glen on hearing the shots, came unpleasantly close to her in her dying throes. When about to bring forth, the tigress avoids the male, and hides her young from him. The native shikaris say that the tiger kills the young ones if he finds them. The mother is a most affectionate parent as a rule, and sometimes exhibits strange fits of jealousy at interference with her young. I heard an instance of this some years ago from my brother, Mr. H. B. Sterndale, who, as one of the Municipal Commissioners of Delhi, took a great interest in the collection of animals in the Queen's Gardens there. Both tiger and leopard cubs had been born in the gardens, and the mother of the latter shewed no uneasiness at her offspring being handled by strangers as they crept through the bars and strayed about; but one day, a tiger cub having done the same, the tigress exhibited great restlessness, and, on the little one's return, in a sudden accession of jealous fury she dashed her paw on it and killed it. I am indebted to Mr. Shillingford for a long list of tigresses with cubs killed during the years 1866 to 1880. Out of 53 cubs (18 mothers) 29 were males and 22 females, the sex of two cubs not being given. This tends to prove that there are an equal number of each sex born—in fact here the advantage is on the side of the males. I have heard it asserted that tigresses are more common, and native shikaris account for it by saying that the male tiger kills the cubs of his own sex; but I have not seen anything to justify this assertion, or the fact of there being a preponderance of females. Mr. Sanderson, however, writes: "Male and female cubs appear to be in about equal proportions. How it is that amongst mature animals tigresses predominate so markedly I am unable to say."

Tigresses have young at all seasons of the year, and they breed apparently only once in three years, which is about the time the cubs remain with their mother.

For the following interesting memorandum I have to thank Mr. Shillingford:—

	Feet.
"Cubs one year old measure	Males 4½ to 5½; Females 4 to 5
Ditto two years old	Males 5½ to 7; Females 5 to 6½
Ditto three years old	Males 7 to 8½; Females 6½ to 7½

"When they reach three years of age they lose their 'milk' canines, which are replaced by the permanent fangs, and at this period the mother leaves them to cater for themselves."

The cubs are interesting pets if taken from the mother very young. I have reared several, but only kept one for any length of time. I have given a full description of Zalim and his ways in 'Seonee.' He was

found by my camp followers with another in a nullah, and brought to me. The other cub died, but Zalim lived to grow up into a very fine tiger, and was sent to England. I never allowed him to taste raw flesh. He had a little cooked meat every day, and as much milk as he liked to drink, and he throve well on this diet. When he was too large to be allowed to roam about unconfined I had a stout buffalo-leather collar made for his neck, and he was chained to a stump near the cook-room door. With grown-up people he was perfectly tame, but I noticed he got restless when children approached him, and so made up my mind to part with him before he did any mischief.

I know nothing of the habits of the tiger of the grass plains, but those of the hill tiger are very interesting, the cattle lifter especially, as he is better known to men. Each individual has his special idiosyncrasy. I wrote of this once before as follows: "Strange though it may seem to the English reader that a tiger should have any special character beyond the general one for cruelty and cunning, it is nevertheless a fact that each animal has certain peculiarities of temperament which are well known to the villagers in the neighbourhood. They will tell you that such a one is daring and rash; another is cunning and not to be taken by any artifice; that one is savage and morose; another is mild and harmless. There are few villages in the wilder parts of the Seonee and Mandla districts without an attendant tiger, which undoubtedly does great damage in the way of destroying cattle, but which avoids the human inhabitants of the place. So accustomed do the people get to their unwelcome visitor that we have known the boys of a village turn a tiger out of quarters which were reckoned too close, and pelt him with stones. On one occasion two of the juvenile assailants were killed by the animal they had approached too near. Herdsmen in the same way get callous to the danger of meddling with so dreadful a creature, and frequently rush to the rescue of their cattle when seized. On a certain occasion one out of a herd of cattle was attacked close to our camp, and rescued single-handed by its owner, who laid his heavy iron-bound staff across the tiger's back; and, on our rushing out to see what was the matter, we found the man coolly dressing the wounds of his cow, muttering to himself: 'The robber, the robber! My last cow, and I had five of them!' He did not seem to think he had done anything wonderful, and seemed rather surprised that we should suppose that he was going to let his last heifer go the way of all the others.

"It is fortunate for these dwellers in the backwoods that but a small percentage of tigers are man-eaters, perhaps not five per cent., otherwise village after village would be depopulated; as it is the yearly tale of lives lost is a heavy one."*

* 'Seonee.'

Tigers are also eccentric in their ways, showing differences in disposition under different circumstances. I believe that many a shikari passes at times within a few yards of a tiger without knowing it, the tendency of the animal being to crouch and hide until the strange-looking two-legged beast has passed. The narrowest escape I ever had is an instance. I had hunted a large tiger, well known for the savageness of his disposition, on foot from ravine to ravine on the banks of the Pench, one hot day in June, and, giving him no rest, made sure of getting him about three o'clock in the afternoon. He had been seen to slip into a large nullah, bordered on one side by open country, a small water-course draining into it from the fields; here was one large *beyr* bush, behind which I wished to place myself, but was persuaded by an old shikari of great local reputation to move farther on. Hardly had we done so when our friend bounded from under the bush and disappeared in a thicket, where we lost him. Ten days after this he was killed by a friend and myself, and he sustained his savage reputation by attacking the elephant without provocation—a thing a tiger seldom does. I had hunted this animal several times, and on one occasion saw him swim the Pench river at one of its broadest reaches. It was the only time I had seen a tiger swim, and it was interesting to watch him powerfully breasting the stream with his head well up. Tigers swim readily, as is well known. I believe it is not uncommon to see them take to the water in the Sunderbunds; and a recent case may be remembered when two of them escaped from the King of Oude's Menagerie, and one swam across the Hooghly to the Botanical Gardens.

There has been some controversy about the way in which tigers kill their prey. I am afraid I cannot speak definitely on the subject, although I have on several occasions seen tigers kill oxen and ponies. I do not think they have a uniform way of doing it, so much depends upon circumstances—certain it is that they cannot smash in the head of a buffalo with a stroke, as some writers make out, but yet I have known them make strokes at the head, in a running fight, for instance, between a buffalo and a tiger—in which the former got off—and in the case of human beings. Of two men killed by the same tiger, one had his skull fractured by a blow; the other, who was killed as we were endeavouring to drive the tiger out of the village, was seized by the loins. He died immediately; the man with the fractured skull lingered some hours longer. Another case of a stroke at the head happened once when I had tied out a pony for a tiger that would not look at cows, over which I had sat for several successive nights. A tiger and tigress came out, and the former made a rush at the *tattu*, who met him with such a kick on the nose that he drew back much astonished; the tigress then dashed at the pony, and I, wishing if possible to save the plucky little animal's life, fired two barrels into her, rolling her over just

as she struck at his head. But it was too late; the pony dropped at the blow and died—not from concussion, however, but from loss of blood, for the jugular vein had been cut open as though it had been done with a knife. So much for the head stroke, which is, I may say, exceptional. As a general rule I think the tiger bears down his victim by sheer weight, and then, by some means which I should hesitate to define, although I have seen it, the head is wrenched back, so as to dislocate the vertebræ. One evening two cows were killed before me. I was going to say the tiger sprang at one, but correct myself—it is not a spring, but a rush on to the back of the animal; he seldom springs all fours off the ground at once. I have never seen a tiger get off his hind legs except in bounding over a fallen tree, or in and out of a ravine. In this case he rushed on to the cow and bore it to the ground; there was a violent struggle, and in the dusky light I could not tell whether he used his mouth or paws in wrenching back the head, which went with a crack. The thing was done in a minute, when he sprang once more to his feet, and the second cow was hurled to the ground in like manner. As his back was turned to me I fired somewhat hastily, thinking to save the cow, but only wounded the tiger, which I lost. Both the cows, however, had their necks completely broken. I cannot now remember the position of the fang-marks in the throat. On another occasion I came across five out of a herd that had been killed, probably by young tigers; every one had the neck broken.

Mr. Sanderson says that herdsmen have described to him how they have noticed the operation: "Clutching the bullock's fore-quarters with his paws, one being generally over the shoulder, he seizes the throat in his jaws from underneath and turns it upwards and over, sometimes springing to the far side in doing so, to throw the bullock over and give the wrench which dislocates its neck. This is frequently done so quickly that the tiger, if timid, is in retreat again almost before the herdsmen can turn round." This account seems reliable. A tiger may seize by the nape in order to get a temporary purchase, but it would be awkward for him to pull the head back far enough to snap the vertebral column.

Now for a few remarks in conclusion. I have written more on the subject than I intended. That tigers are carrion feeders is well known, but that sometimes they prefer high meat to fresh I had only proof of once. A tiger killed a mare and foal, on which he feasted for three days; on the fourth nothing remaining but a very offensive leg; we tied out a fine young buffalo calf for him within a yard or two of the savoury joint. The tiger came during the night and took away the leg, without touching the calf; and, devouring it, fell asleep, in which condition we, having tracked him up the nullah, found and killed him.

The tiger is not always monarch over all the beasts of the field. He

positively afraid of the wild dog (*Cuon rutilans*), which readily attacks him in packs. Then he often finds his match in the wild boar. I have myself seen an instance of this, in which the tiger was not only ripped to death, but had his chest-bone gnawed and crushed, evidently after life was extinct.

Buffalos in herds hesitate not in attacking a tiger; and I saw one instance of their saving their herdsman from a man-eater. My camp was pitched on the banks of a stream under some tall trees. I had made a *détour* in order to try and kill this man-eater, and had sent on a hill tent the night before. I was met in the morning by the *khalasi* in charge, with a wonderful story of the tiger having rushed at him, but as the man was a romancer I disbelieved him. On the other side of the stream was a gentle slope of turf and bushes, rising gradually to a rocky hill. The slope was dotted with grazing herds, and here and there a group of buffalos. Late in the afternoon I heard some piercing cries from my people of "*Bagh! Bagh!*" The cows stampeded, as they always do. A struggle was going on in the bush, with loud cries of a human voice. The buffalos threw up their heads, and, grunting loudly, charged down on the spot, and then in a body went charging on through the brushwood. Other herdsmen and villagers ran up, and a charpoy was sent for and the man brought into the village. He was badly scratched, but had escaped any serious fang wounds from his having, as he said, seen the tiger coming at him, and stuffed his blanket into his open mouth, whilst he belaboured him with his axe. Anyhow but for his buffalos he would have been a dead man in three minutes more.

THE PARDS OR PANTHERS.

To these are commonly assigned the name of Leopard, which ought properly to be restricted to the hunting leopard (*Felis jubata*), to which we have also misappropriated the Indian name *Chita*, which applies to all spotted cats, *Chita-bagh* being spotted tiger. The same term, derived from the adjective *chkita*, spotted or sprinkled, applies in various forms to the other creatures, such as *Chital*, the spotted deer (*Axis*), *Chita-bora*, a kind of speckled snake, &c. *Leopardus* or lion-panther was, without doubt, the name given by the ancients to the hunting leopard, which was well known to them from its extending into Africa and Arabia. Assuredly the prophet Habakkuk spoke of the hunting chita when he said of the Chaldæans: "That bitter and hasty nation . . . . their horses also are swifter than the leopards," for the pard is not a swift animal, whereas the speed of the other is well known.

The name was given to it by the ancients on the supposition that it

was a cross between the lion and the pard, from a fancied resemblance to the former on account of the mane or ruff of hair possessed by the hunting leopard. Apparently this animal must have been more familiar to our remote ancestors than the pard, for the name has been attached for centuries to the larger spotted Cats indiscriminately. I have not time just now to attempt to trace the species of the leopard which formerly graced the arms of the English kings, but I should not be surprised if it were the guepard or chita. The old representations were certainly attenuated enough; and the animal must have been familiar to the crusaders, as we know it was before them to the Romans.

Mr. Blyth, who speculated on the origin of the name, in one of his able articles on the felines of India in the *India Sporting Review* of April 1856, makes no allusion to the above nor to the probable confusion that may have arisen in the middle ages over the spotted Cats. Although the term leopard, as applied to panthers, has the sanction of almost immemorable custom, I do not see why, in writing on the subject, we should perpetuate the misnomer, especially as most naturalists and sportsmen are now inclined to make the proper distinction. I have always avoided the use of the term leopard, except when speaking of the hunting chita, preferring to call the others panthers.

Then again we come on disputed ground. Of panthers how many have we, and how should they be designated? I am not going farther afield than India in this discussion beyond alluding to the fact that the jaguar of Brazil is almost identical with our pard as far as marking goes, but is a stouter, shorter-tailed animal, which justifies his being classed as a species; therefore we must not take superficial colouring as a test, but class the black and common pards together; the former, which some naturalists have endeavoured to made into a separate species (*Felis melas*), being merely a variety of the latter. They present the same characteristics, although Jerdon states that the black is the smaller animal. They have been found in Java to inhabit the same den, according to Professor Reinwardt and M. Kuhl, and they inter-breed, as has been proved by the fact that a female black pard has produced a black and a fulvous cub at the same birth. This is noticed by Mr. Sanderson in his book, and he got the information from the director of the Zoological Society's Menagerie at Amsterdam. "Old Fogy," a constant contributor to the old *India Sporting Review*, a good sportsman and naturalist, with whom Blyth kept up a correspondence, wrote in October 1857 that, "in a litter of four leopard cubs one was quite black; they all died, but both the parents were of the ordinary colour and marking; they were both watched at their cave, and at last shot, one with an arrow through the heart. Near a hill village a black male leopard was often seen and known to consort with an ordinary female. I have observed them myself once, if not twice."

An observant sportsman, "Hawkeye," in one of his letters to the *South of India Observer*, remarks that "on one occasion a gentleman saw an old leopard accompanied by two of her offspring, one red, the other black." He also says he has never known "of two black leopards in company," but black pards have bred in zoological gardens. I am told that cubs have been born in the Calcutta Garden, but they did not live. General MacMaster, in his notes on Jerdon, makes the pertinent remark: "If however black panthers are only accidental, it is odd that no one has yet come on a black specimen of one of the larger cats, *F. leo tigris*." I see no reason why such should not yet be discovered; he was perhaps not aware that the jaguar of Brazil, which comes next to the tiger, has been found black (*Felis nigra* of Erxleben). A black tiger would be a prize. General MacMaster relates that he once watched a fine black cat basking in the sun, and noticed that in particular lights the animal exhibited most plainly the regular brindled markings of the ordinary gray wild or semi-wild cat. These markings were as black or blacker than the rest of his hair. His mother was a half-wild gray brindle.

I think we have sufficient evidence that the black pard is merely a variety of the common one, but now we come to the pards themselves, and the question as to whether there are two distinct species or two varieties; Blyth, Jerdon and other able naturalists, although fully recognizing the differences, have yet hesitated to separate them, and they still remain in the unsatisfactory relation to each other of varieties. I feel convinced in my own mind that they are sufficiently distinct to warrant their being classed, and specifically named apart. It is not as I said before, that we should go upon peculiarities of marking and colour, although these are sufficiently obvious, but on their osteology and also the question of interbreeding and production. Grant their relative sizes, one so much bigger than the other, and the difference in colour and marking, has it ever been known that out of a litter of several cubs by a female of the larger kind, one of the smaller sort has been produced, or *vice versâ*? This is a question that yet remains for investigation. My old district had both kinds in abundance, and I have had scores of cubs, of both sorts, brought to me—cubs which could be distinguished at a glance as to which kind they belonged to, but I never remember any mixture of the two. As regards the difference in appearance of the adults there can be no question. The one is a higher, longer animal, with smooth shiny hair of a light golden fulvous, the spots being clear and well defined, but, as is remarked by Sir Walter Elliot, the strongest difference of character is in the skulls, those of the larger pard being longer and more pointed, with a ridge running along the occiput, much developed for the attachment of the muscles, whereas the smaller pard has not only a rougher coat, the spots being more blurred, but it is

comparatively a more squat built animal, with a rounder skull without the decided occipital ridge. There is a mass of evidence on the point of distinctness—Sir Walter Elliot, Horsfield, Hodgson, Sir Samuel Baker, Johnson (author of 'Field Sports in India'), "Mountaineer," a writer in the *Bengal Sporting Review*, even Blyth and Jerdon, all speak to the difference, and yet no decided separation has been made. There is in fact too much confusion and too many names. For the larger animal *Felis pardus* is appropriate, and the *leopardus* of Temminck, Schreber and others is not. Therefore that remains; but what is the smaller one to be called? I should say *Felis panthera* which, being common to Asia and Africa, was probably the panther of the Romans and Greeks. Jerdon gives as a synonym *F. longicaudata* (Valenciennes), but I find on examination of the skulls of various species that *F. longicaudata* has a complete bony orbit which places it in Gray's genus *Catolynx*, and it is too small for our panther. We might then say that we have the pard, the panther, and the leopard in India, and then we should be strictly correct. Some sportsmen speak of a smaller panther which Kinloch calls the third (second?) sort of panther, but this differs in no respect from the ordinary one, save in size, and it is well known that this species varies very much in this respect. I am not singular in the views I now express. Years ago Colonel Sykes, who was a well known naturalist, said of the pard: "It is a taller, stronger, and slighter built animal than the next species, which I consider the *panther*."

The skull of the pard in some degree resembles that of the jaguar, which again is nearest the tiger, whereas that of the panther appears to have some affinity to the restricted cats. In disposition all the pards and panthers are alike sanguinary, fierce and incapable of attachment. The tiger is tameable, the panther not so. I have had some experience of the young of both, and have seen many others in the possession of friends; and though they may, for a time, when young, be amusing pets, their innate savageness sooner or later breaks out. They are not even to be trusted with their own kind. I have known one to turn on a comrade in a cage, kill and devour him, and some of my readers may possibly remember an instance of this in the Zoological Gardens at Lahore, when, in 1868, a pard one night killed a panther which inhabited the same den, and ate a goodly portion of him before dawn. They all show more ferocity than the tiger when wounded, and a man-eating pard is far more to be dreaded than any other man-eater, as will be seen farther on from the history of one I knew.

No. 202. FELIS PARDUS.

The Pard (Jerdon's No. 105).

NATIVE NAMES.—*Tendua*, *Chita* or *Chita-bagh*, *Adnara*; Hindi, *Honiga*; Canarese, *Asnea*; Mahratti, *Chinna puli*; Telegu, *Burkal*; Gondi, *Bay-heera*; and *Tahr-hay* in the Himalayas.

HABITAT.—Throughout India, Burmah, and Ceylon, and extending to the Malayan Archipelago.

DESCRIPTION.—A clean, long limbed, though compact body; hair close and short; colour pale fulvous yellow, with clearly defined spots in rosettes; the head more tiger-like than the next species; the skull is longer and more pointed, with a much developed occipital ridge.

SIZE.—Head and body from 4½ to 5½ feet; tail from 30 to 38 inches.

This is a powerful animal and very fierce as a rule, though in the case of a noted man-eater I have known it exhibit a curious mixture of ferocity and abject cowardice. It is stated to be of a more retiring disposition than the next species, but this I doubt, for I have frequently come across it in the neighbourhood of villages to which it was probably attracted by cattle. It may not have the fearlessness or impudence of the panther, which will walk through the streets of a town and seize and devour its prey in a garden surrounded by houses, as I once remember, in the case of a pony at Seonee, but it is nevertheless sufficiently bold to hang about the outskirts of villages. Those who have seen this animal once would never afterwards confuse it with what I would call the panther. There is a sleekness about it quite foreign to the other, and a brilliancy of skin with a distinctness of spots which the longer, looser hair does not admit of. But with all these external differences I am aware that there will be objection to classifying it as a separate species, unless the osteological divergences can be satisfactorily determined, and for this purpose it would be necessary to examine a large series of authenticated skulls of the two kinds.

The concurrence of evidence as to the habits of this species is that it is chiefly found in hilly jungles preying on wild animals, wild pigs, and monkeys, but not unfrequently, as I know, haunting the outskirts of villages for the sake of stray ponies and cattle. The largest pard I have ever seen was shot by one of my own shikaris in the act of stalking a pony near a village. I was mahseer-fishing close by at the time, and had sent on the man, a little before dusk, to a village a few miles off, to arrange for beating up a tiger early next day. Jerdon says this is the kind most common in Bengal, but he does not say in what parts of Bengal, and on what authority. I have no doubt it abounds in Sontalia

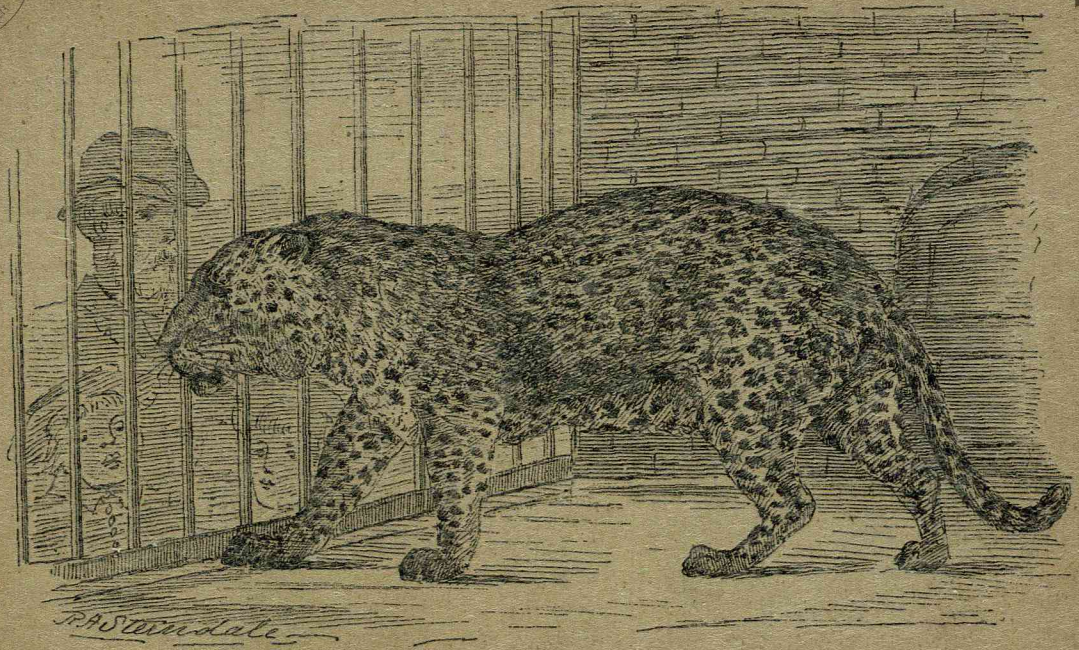
Assam, and many other hilly parts. At Colgong, Mr. Barnes informed him that many cases of human beings killed by pards were known in the Bhaugulpore district. At Seonee we had one which devastated a tract of country extending to about 18 miles in diameter. He began his work in 1857 by carrying off a follower of the Thakur of Gurwarra, on whom we were keeping a watch during the troublous times of the mutiny. My brother-in-law, Colonel Thomson and I, went after him under the supposition that it was a tiger that had killed the man, and it was not till we found the body at the bottom of a rocky ravine that we discovered it was a pard. During the beat he came out before us, went on, and was turned back by an elephant and came out again a third time before us; but we refrained from firing as we expected a man-eating tiger. I left Seonee for two years to join the Irregular Corps to which I had been posted, and after the end of the campaign, returned again to district work, and found that the most dreaded man-eater in the district was the pard whose life we had spared. There was a curious legend in connection with him, like the superstitious stories of Wehr wolves in Northern Europe. I have dealt fully with it in "Seonee," and Forsyth has also given a version of it in the 'Highlands of Central India,' as he came to the district soon after the animal was destroyed. Some of the aborigines of the Satpura Range are reputed to have the power of changing themselves into animals at will, and back again into the human form. The story runs, that one day one of these men, accompanied by his wife, came to a glade in the jungle where some nilgai were feeding. The woman expressed a wish for some meat, on which the husband gave her a root to hold, and to give him to smell on his return. He changed himself into a pard, killed one of the nilgai, and came bounding back for the root; but the terrified woman lost her nerve, flung away the charm, and rushed from the place. The husband hunted about wildly for the root, but in vain; and then inflamed with rage he pursued her, and tore her to pieces and continued to wreak his vengeance on the human race. Such was the history of the man-eating panther of Kahani, as related in the popular traditions of the country, and certainly everything in the career of this extraordinary animal tended to foster the unearthly reputation he had gained. Ranging over a circle, the radius of which may be put at eighteen miles, no one knew when and where he might be found. He seemed to kill for killing's sake, for often his victims—at times three in a single night—would be found untouched, save for the fatal wound in the throat. The watcher on the high machaun, the sleeper on his cot in the midst of a populous village, were alike his prey. The country was demoralized; the bravest hunters refused to go after him; wild pigs and deer ravaged the fields; none would dare to watch the growing crops. If it had been an ordinary panther who would have cared? Had not

each village its Shikari? men who could boast of many an encounter with tiger and bear, and would they shrink from following up a mere animal? Certainly not; but they knew the tradition of Chinta Gond, and they believed it. What could they do?

On the morning of the second day, after leaving Amodagurh, the two sportsmen neared Sulema, a little village not far from Kahani, out of which it was reported the panther had taken no less than forty people within three years. There was not a house that had not mourned the loss of father, or mother, or brother, or sister, or wife or child, from within this little hamlet. Piteous indeed were the tales told as our friends halted to gather news, and the scars of the few who were fortunate enough to have escaped with life after a struggle with the enemy, were looked at with interest; but the most touching of all were the stories artlessly told by a couple of children, one of whom witnessed the death of a sister, and the other of a brother, both carried off in broad daylight, for the fell destroyer went boldly to work, knowing that they were but weak opponents."* I was out several times after this diabolical creature, but without success; as I sat out night after night I could hear the villagers calling from house to house hourly, "*Jágté ho bhiya! jágté ho!*" "Are you awake, brothers? are you awake!" All day long I scoured the country with my elephant, all night long I watched and waited. My camp was guarded by great fires, my servants and followers were made to sleep inside tents, whilst sentries with musket and bayonet were placed at the doors; but all to no purpose. The heated imagination of one sentry saw him glowering at him across the blazing fire. A frantic camp-follower spoilt my breakfast next morning ere I had taken a second mouthful, by declaring he saw him in an adjoining field. Then would come in a tale of a victim five miles off during the night, and then another, and sometimes a third. I have alluded before to his cowardice; in many cases a single man or boy would frighten him from his prey. On one occasion, in my rounds after him, I came upon a poor woman bitterly crying in a field; beside her lay the dead body of her husband. He had been seized by the throat and dragged across the fire made at the entrance of their little wigwam in which they had spent the night, watching their crops. The woman caught hold of her husband's legs, and, exerting her strength against the man-eater's, shrieked aloud. He dropped the body and fled, making no attempt to molest her or her little child of about four years of age. This man was the third he had attacked that night.

He was at last killed, by accident, by a native shikari who, in the dusk, took him for a pig or some such animal, and made a lucky shot; but the tale of his victims had swelled over two hundred during the three years of his reign of terror.

* 'Seonee.'



Felis panthera

[*From a fine specimen in the Regent's Park Gardens.*]

No. 203. FELIS PANTHERA.

The Panther.

NATIVE NAMES.—*Chita*, *Gorbacha*, Hindi; *Beebeea-bagh*, Mahrathi, *Bibla*, of the Chita-catchers; *Ghur-hay* or *Dheer-hay* of the hill tribes; *Kerkal*, Canarese.

HABITAT.—India generally, Burmah and Ceylon, extending also into the Malayan countries.

DESCRIPTION.—Much smaller than the last, with comparatively shorter legs and rounder head; the fur is less bright; the ground-work often darker in colour, and the rosettes are more indistinct which is caused by the longer hairs intermingling and breaking into the edges of the spots; tail long and furry at the end. According to Temminck the tail is longer than that of the last species, having 28 caudal vertebræ against 22 of the other; if this be found to be the normal state, there will be additional grounds for separating the two.

SIZE.—Head and body, 3 to 3½ feet; tail, 2½ feet; height from 1½ to 2 feet.

This animal is more common than the pard, and it is more impudent in venturing into inhabited places. This is fortunate, for it is seldom a man-eater, although perhaps children may occasionally be carried off. I have before mentioned one which killed and partially devoured a pony in the heart of a populous town, and many are the instances of dogs being carried off out of the verandahs of Europeans' houses. A friend of mine one night being awoke by a piteous howl from a dog, chained to the centre pole of his tent, saw the head and shoulders of one peering in at the door; it retreated but had the audacity to return in a few minutes. Jerdon and other writers have adduced similar instances. It is this bold and reckless disposition which renders it easier to trap and shoot. The tiger is suspicious to a degree, and always apprehensive of a snare, but the panther never seems to trouble his head about the matter, but walks into a trap or resumes his feast on a previously killed carcase, though it may have been moved and handled. There is another thing, too, which shows the different nature of the beast. There is little difficulty in shooting a panther on a dark night. All that is necessary is to suspend, some little distance off, a common earthen *gharra* or water pot, with an oil light inside, the mouth covered lightly with a sod, and a small hole knocked in the side in such a way as to allow a ray of light to fall on the carcase. No tiger would come near such an arrangement, but the panther boldly sets to his dinner without suspicion, probably from his familiarity with the lights in the huts of villages.

I may here digress a little on the subject of night shooting. Every one who has tried it knows the extreme difficulty in seeing the sights of

the rifle in a dark night. The common native method is to attach a fluff of cotton wool. On a moonlight night a bit of wax, with powdered mica scattered on it, will sometimes answer. I have seen diamond sights suggested, but all are practically useless. My plan was to carry a small phial of phosphorescent oil, about one grain to a drachm of oil dissolved in a bath of warm water. A small dab of this, applied to the fore and hind sights, will produce two luminous spots which will glow for about 40 or 50 seconds or a minute.

Dr. Sal Müller says of this species that it is occasionally found sleeping stretched across the forked branch of a tree, which is not the case with either the tiger or the pard. According to Sir Stamford Raffles, the *Rimau-dahan* or clouded panther (miscalled tiger) *Felis macrocelis*, has the same habit.

I would remark in conclusion that in the attempt to define clearly the position of these two animals the following points should be investigated by all who are interested in the subject and have the opportunity.

First the characteristics of the skull :—

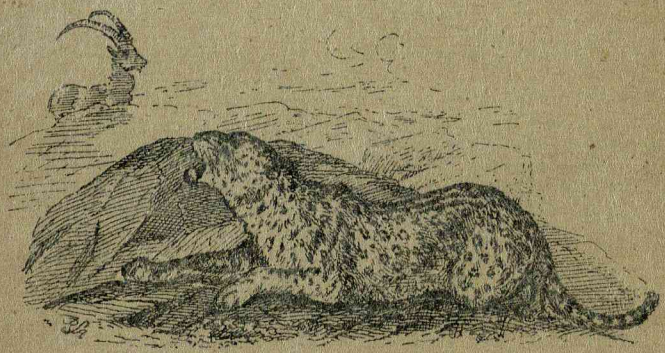
viz.—Length, and breadth as compared with length of each, with presence or absence of the occipital ridge.

2ndly.—Number of caudal vertebræ in the tails of each.

3rdly.—Whether in a litter, from one female, cubs of each sort have been found.

No. 204. FELIS UNCIA.

The Ounce or Snow Panther (*Jerdon's No.* 106).



Felis uncia.

NATIVE NAMES.—*Iker*, Tibetan; *Sah*, Bhotia; *Phalé*, Lepcha; *Burrel-hay*, Simla hillmen; *Thurwag* in Kunawur. *The Snow-Leopard* of European sportsmen.

HABITAT.—Throughout the Himalayas, and the highland regions of Central Asia.

DESCRIPTION.—Pale yellowish or whitish isabelline, with small spots on the head and neck, but large blotchy rings and crescents, irregularly dispersed on the shoulders, sides and haunches; from middle of back to root of tail a medium irregular dark band closely bordered by a chain of oblong rings; lower parts dingy white, with some few dark spots about middle of abdomen; limbs with small spots; ears externally black; tail bushy with broad black rings.

SIZE.—Head and body about 4 feet 4 inches; tail, 3 feet: height, about 2 feet.

I have only seen skins of this animal, which is said to frequent rocky ground, and to kill *Barhel*, *Thar*, sheep, goats, and dogs, but not to molest man. This species is distinguishable from all the preceding felines by the shortness and breadth of the face and the sudden elevation of the forehead—*Gray*. Pupil round—*Hodgson*.

No. 205. FELIS DIARDII *vel* MACROCELIS.

The Clouded Panther (*Jerdon's No.* 107).

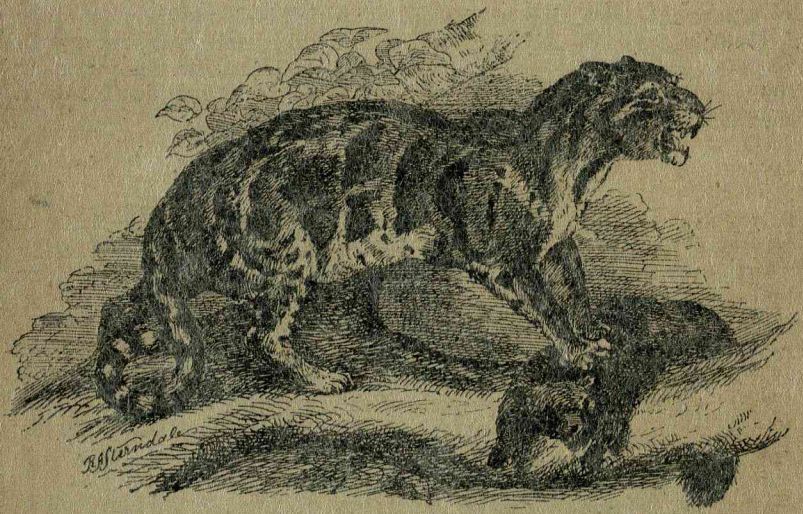
NATIVE NAMES.—*Tungmar*, Lepcha; *Zik*, Bhotia; *Lamchitta*, of the Khas tribe (*Jerdon*). *Rimau dahan* of Sumatra.

HABITAT.—Nepal, Sikim, Assam, Burmah, and down the Malayan Peninsula to Sumatra, Java and Bornea.

DESCRIPTION.—A short-legged long-bodied animal, with a very elongated skull; the upper canines are the longest in comparison of all living felines, and in this respect it comes nearest to the extinct species *Felis smilodon*. The ground-work of the colouring is a pale buff, with large, irregular, cloud-like patches of black. Blyth remarks that the markings are exceedingly beautiful, but most difficult to describe, as they not only vary in different specimens, but also in the two sides of one individual. Jerdon's description is as follows: "Ground colour variable, usually pale greenish brown or dull clay brown, changing to pale tawny on the lower parts, and limbs internally, almost white however in some. In many specimens the fulvous or tawny hue is the prevalent one; a double line of small chain-like stripes from the ears, diverging on the nape to give room to an inner and smaller series; large irregular clouded spots or patches on the back and sides edged very dark and crowded together; loins, sides of belly and belly marked with irregular small patches and spots: some black lines on the cheeks and sides of neck, and a black band across the throat; tail with dark rings, thickly furred, long; limbs bulky, and body heavy and stout; claws very powerful." Hodgson stated that the pupil of the eye is round, but Mr. Bartlett, whose opportunities of observation have been much more frequent, is positive that it is oval.

SIZE.—Head and body, 3½ feet; tail, 3 feet, but Jerdon states it grows to a larger size.

This is one of the most beautiful of all the cat family. It is not, however, one of the most elegant in form and motion, but its colouring is exquisite; it is quite an arboreal feline, and is found only in forests, frequently sleeping or lying in wait across the forked branches of trees, from which habit it acquires its Malayan name, *dahan*, signifying the forked branch of a tree. The young seem to be easily tamed, according to Sir Stamford Raffles, who describes two which he had in confinement. Dr. Jerdon also states the same, he having procured a young one in the



Felis Diardii.

neighbourhood of Darjeeling. In the Zoological Gardens in London there was a very fine specimen about four years ago. Professor Parker says of it: "It was not always to be seen, as it was kept during the day fastened up in one of the sleeping apartments at the back of a cage in the lion-house, and was left out only for about half an hour before the gardens closed. It was well worth stopping to see. As soon as the iron door of its cell was raised, it would come out into the large cage with a peculiar sailor-like slouch, for owing to the shortness of its legs, its gait was quite different to that of an ordinary cat, and altogether less elegant. The expression of the face, too, was neither savage nor majestic nor intelligent, but rather dull and stupid. It was fond of

assuming all sorts of queer attitudes. Brehm describes one as lying prone on a thick branch placed in its cage, with all four legs hanging down straight, two on each side of the branch—certainly a remarkable position for an animal to assume of its own free will.

The type of this animal constitutes the genus *Neofelis* of Gray, containing two species, this and the *Neofelis (leopardus) brachyurus* of Formosa.

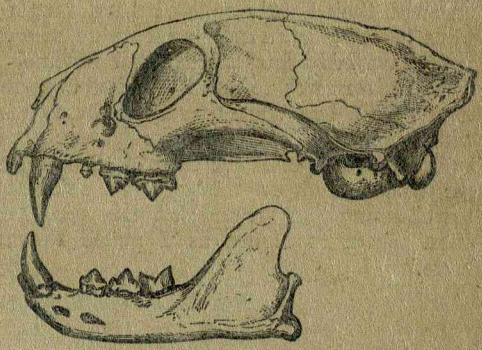
No. 206. FELIS VIVERRINA.

The Large Tiger-Cat (Jerdon's No. 108).

NATIVE NAMES.—*Mach-bagral, Bagh-dasha,* Bengali; *Bunbiral, Khupya-bagh,* Hindi; *Handoon-deeva,* Singhalese.

HABITAT.—India generally, Burmah, the Malay countries, and Ceylon. Jerdon says he has not heard of it in Central India nor in the Carnatic, nor farther west of Nepal. I have been, however, informed that a wild cat was killed lately at Jeypore in the act of carrying off an infant of four months old. I know of no cat, save this species, capable of such a proceeding. The child was rescued alive.

DESCRIPTION.—"Of a mouse gray colour, more or less deep and sometimes tinged with tawny, with large dark spots, more or less numerous, oblong on the back and neck and in lines, more or less rounded elsewhere, and broken or coalescing" (but never ocellate: *Blyth*); "cheeks white; a black face stripe; beneath dull white; chest with five or six dark bands; belly spotted," (whence the name *celidogaster* applied by Temminck) "tail with six or seven dark bands and a black tip" (sometimes spots only); "feet unspotted."—*Jerdon.*



Skull of *Felis viverrina.*

SIZE.—Head and body 30 to 34 inches; tail only 10 to 13; height about 15 or 16; weight according to Hodgson and Jerdon, about 17 lbs.

The frontal and jugal bones in old specimens of this species are united by a bar which forms a complete bony orbit—a peculiarity possessed, as I have before observed, by *F. longicaudata*, but by few other felines. *Felis rubiginosa, F. planiceps,* and *F. Elliotí* are also cats of this type, which Gray has separated into the genus *Viverriceps.*

This large cat is not uncommon near Calcutta, and is reputed to live much on fish and fresh-water shells, but also I should say on larger game. According to some authors (Buchanan-Hamilton, for instance), it is fierce and untameable, but Blyth states that he had several big toms, quite tame, and in the Surrey Zoological Gardens there was many years ago a very fine male which he had frequently handled and had even on his lap. He relates, however, in another part, that a newly caught male of this species killed a tame young leopardess of twice its own size, having broken through the partition of a cage, but he did not eat any portion of her. The Prince of Wales took home a very fine specimen of this cat among his collection of living animals.

Mr. Rainey writes of the ferocity of this cat in the following terms: "I can testify to the existence of the above qualities in this animal (*Felis viverrina*, Bennett), which is rather abundant in these parts, generally taking up its quarters in low, swampy jungle, where it often carries off calves, for which the leopard (*F. leopardus*, Linn.), undeservedly gets credit. Lately, a couple of months ago, a pair of them at night broke into a matted house, and went off with a brace of ewes, which had half-a-dozen lambs between them, born only a short time before their mothers met with their bloody end. I have caught this species in traps, and when let loose in an indigo vat with a miscellaneous pack of dogs, they have invariably fought hard, and at times proved too much for their canine adversaries, so that I have had to go to their rescue, and put an end to the fight, by a spear-thrust, or a heavy whack on the back of the head with a stout club. Some years ago one got into my fowl-house at night, and just as I opened the door to enter inside, it made a fierce jump at me from a perch on the opposite side. I had just time to put the barrel of my gun forward, on the muzzle of which it fell, and had its chest blown to atoms, as I pulled the trigger instantly it alighted there."

No. 207. FELIS MARMORATA.

The Marbled Tiger-Cat (*Jerdon's No.* 109).

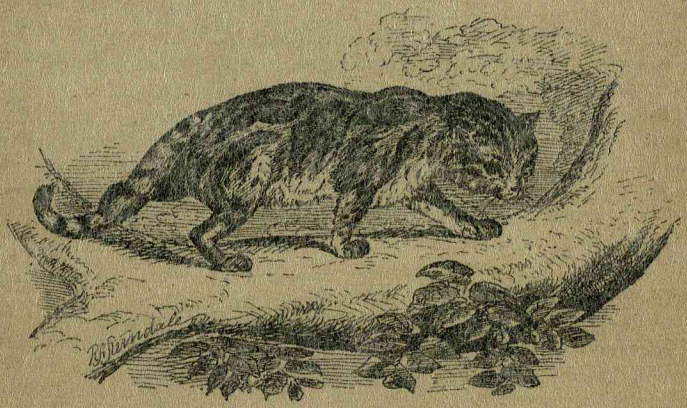
HABITAT.—The Sikim Himalayas, Assam, Burmah, and the Malayan countries.

DESCRIPTION.—"Size of a domestic cat, but with stouter limbs and a much longer and thicker tail, of uniform thickness throughout and reaching back to the occiput when reflected; the upper canines are not remarkably elongated as in *F. macroceloides* (*macrocelis*); ears rather small and obtusely angulated, with a conspicuous white spot on their hinder surface" (*Blyth*). "Ground colour dingy-fulvous, occasionally yellowish grey; the body with numerous elongate wavy black spots, somewhat clouded or marbled; the head and nape with some narrow blackish lines, coalescing into a dorsal interrupted band; the thighs and

[illegible] of the sides with black round spots; the tail black, spotted, and with the tip black; belly yellowish white."—*Jerdon.*

SIZE.—Head and body, 18 to 24 inches; tail, 14 to 16.

This beautiful little cat is almost a miniature of the clouded panther, and Blyth confuses the Malayan name of the latter, and applies it to this species, which probably arose from his quoting as a synonym, *F. diardii*, which, however, in the same paper he repudiates, as the description of the



Felis marmorata.

size of *F. diardii* clearly proved a much larger animal. This is the type of Grey's genus *Catolynx*, the other species in India being *F. charltoni*. The genus is peculiar from the resemblance of the nasal bones to those of the lynx, and from the complete or nearly complete bony orbit; the skull differs, however, greatly from the *viverriceps* form, being much more spherical with very short nasal bones. There is an admirable illustration in De Blainville's 'Ostéographie' of it under the name of *F. longicaudata*. Very little is known as yet of the habits of this cat.

No. 208. FELIS BENGALENSIS.

The Leopard-Cat (Jerdon's No. 110).

NATIVE NAMES.—*Bun Beral*, Bengali; *Jungli Bilao*, *Chhita Bilao*, Hindi; *Theet-kyoung* in Arakan; *Lhau-rahn-manjur*, Mahrathi; *Wagati*, Mahratti of the Ghats.

HABITAT.—India generally, in hilly parts; Assam, Burmah, and the Malay countries: also Ceylon.

DESCRIPTION.—About the size of the domestic cat, but with extremely

variable colouring and a short, thick, cylindrical tail reaching, when turned back, above half way up the spine. Blyth says of it: "In general the ground hue is pale fulvous, with under parts of the purest white, richly marked with deep black; black lines on the crown and nape; angular spots on the body wholly or partially black, or, *en rosette*, with deeper fulvous within and round; black spots on the limbs and tail; sometimes the body markings unite more or less into longitudinal streaks and rarely a marbled appearance is assumed on the upper parts."

SIZE.—Head and body, 24 to 26 inches; tail 11 to 12.

It is useless to lay down, as in Jerdon, a very accurate description of the markings of this cat, for it varies to such an extent as to have given rise to at least sixteen synonymous names, if not more. You will find the same cat repeated over and over again in Gray's catalogue, and a different name in almost every book of natural history; it figures at large as *Felis Bengalensis*, *undata*, *Javanensis*, *Sumatrana*, *minuta*, *torquata Nipalensis*, *wagati*, *pardochrous*, *undulata*, *Ellioti*, *Horsfieldi*, *inconspicua*, *Chinensis*, *Reevesii*, and *Diardii*. Blyth pertinently remarks: "The varieties of this handsome little cat are endless, and nominal species may be made of it, *ad libitum*, if not rather *ad nauseam*."

This is a very savage animal, and not tameable. Jerdon and Blyth both agree in this from specimens they kept alive. Hutton also writes: "I have a beautiful specimen alive, so savage that I dare not touch her." I should like to possess a young one, having been successful with many so-called savage animals. I had a wild-cat once which was very savage at first, but which ultimately got so tame as to lie in my lap whilst I was at work in office or writing, but she would never allow me to touch or stroke her; she would come and go of her own sweet will, and used to come daily, but she would spit and snarl if I attempted a caress. Blyth says that in confinement it never paces its cage, but constantly remains crouched in a corner, though awake and vigilant; but I have always found that the confinement of a cage operates greatly against the chance of taming any wild animal. Sir Walter Elliot says that the Shikaris attribute to it the same habit as that which used erroneously to be ascribed to the glutton, viz., that of dropping from trees on to its prey and eating its way into the neck. It preys chiefly on small game—poultry, hares, and is said to destroy small deer. McMaster relates he "saw one carry off a fowl nearly as large as itself, shaking it savagely meanwhile, and making a successful retreat in spite of the abuse, uproar, and missiles which the theft caused." Dr. Anderson says it is essentially arboreal, and the natives assert it lives on birds and small mammals, such as *Squirrels* and *Tupaiæ*. According to Hutton it breeds in May, producing three or four young in caves or beneath masses of rock.

No. 209. FELIS JERDONI.

The Lesser Leopard-Cat (Jerdon's No. 111).

HABITAT.—Peninsula of India, probably also Assam and Burmah.

DESCRIPTION.—"Very like *F. Bengalensis;* but smaller, the ground colour of the upper part grey, untinged with fulvous" (*Blyth*). A few small distinct black spots; spots of sides of legs round, long in the centre of the back; tail and feet dark greyish brown, but slightly spotted, if at all; chin, throat, and under parts white, with black spots.

No. 210. FELIS AURATA.

The Bay Cat (Jerdon's No. 112).

HABITAT.—The Nepal and Sikim Himalayas, probably also Assam; and as it occurs in the Malayan islands, it should be found in Burmah. It is likewise an African species, Gold Coast.

DESCRIPTION. — Deep bay red above, paler below; a few indistinct dark spots on the hind legs and sides; throat white; inside of ears black; the head beautifully striped with black, white and orange; the cheeks are yellowish, with two black streaks; a pale black edged line over the eyes; whiskers black, with white tips; claws black, Jerdon says that the lower surface in some is reddish white, with large and small maroon spots.

Felis aurata.

SIZE.—Head and body, 31 inches and over; tail, 19. There is a fine illustration of this cat in Cassell's 'Natural History,' edited by Professor Martin Duncan, vol. ii., page 58.

Very little is known of the habits of this cat. Mr. Hodgson's first specimen "was caught in a tree by some hunters in the midst of an exceedingly dense forest. Though only just taken it bore confinement very tranquilly, and gave evident signs of a tractable disposition, but manifested high courage, for the approach of a huge Bhotea dog to its cage excited in it symptoms of wrath only, none of fear." That it is found in Burmah is extremely probable, as it inhabits the Malay countries,

and the Rev. J. Mason speaks of a tiger cat in Tenasserim, "which the Karens call the *Fire Tiger* from the colour of its skin, which is of an uniform red."

No. 211. FELIS RUBIGINOSA.

The Rusty-spotted Cat (Jerdon's No. 113).

NATIVE NAME.—*Namali pelli*, Tamil.—*Jerdon.*

HABITAT.—Southern India and Ceylon. Jerdon says he never saw or heard of it in Central India, or on the Malabar Coast, but I got it at Seonee in the Central Provinces.

DESCRIPTION.—Size of a small domestic cat, with a tail half the length of the body; colour greyish with a rufous tinge, or greenish grey tinged with rufous; the under parts white, with large rufous spots; ears small; four well defined dark brown or black lines along the forehead and nape, and three along the back, the latter being interrupted into longish spots; a series of rusty coloured spots on the sides; fur very short; tail uniform in colour, more rufous than the body, sometimes indistinctly spotted; insides of limbs with large brown spots; feet reddish grey above with black soles, whiskers long and white.

SIZE.—Head and body, 16 to 18 inches; tail, 9½.

Jerdon says: "This very pretty little cat frequents grass in the dry beds of tanks, brushwood, and occasionally drains in the open country and near villages, and it is said not to be a denizen of the jungles. I had a kitten brought to me when very young, in 1846, and it became quite tame, and was the delight and admiration of all who saw it. Its activity was quite marvellous, and it was very playful and elegant in its motions. When it was about eight months old I introduced it into a room where there was a small fawn of the gazelle, and the little creature flew at it the moment it saw it, seized it by the nape, and was with difficulty taken off. I lost it shortly after this. It would occasionally find its way to the rafters of bungalows and hunt for squirrels."

Jerdon doubted the existence of this cat in Central India, but, in 1859 or 1860, I had two kittens brought to me by a Gond in the Seonee district, and I kept them for many months. They became perfectly tame, so much so that, although for nine months of the year I was out in camp, they never left the tents, although allowed to roam about unconfined. The grace and agility of their motions was most striking. I have seen one of them balance itself on the back of a chair, and when one of the pair died it was ludicrous to see the attempts of a little gray village cat, which I got to be a companion to the survivor, to emulate the gymnastics of its wild comrade. At night the little cats were put into a basket, and went on with the spare tents to my next halting place; and on my arrival next morning I would find them frisking about the tent roof between the two canvasses, or scrambling up the trees

der which we were pitched. Whilst I was at work I usually had one in my lap and the other cuddled behind my back on the chair. One day one of them, which had been exploring the hollows of an old tree close by, rushed into my tent and fell down in convulsions at my feet. I did everything in my power for the poor little creature, but in vain, it died in two or three minutes, having evidently been bitten by a snake. The survivor was inconsolable, refused food, and went mewing all over the place and kept rolling at my feet, rubbing itself against them as though to beg for the restoration of its brother. At last I sent into a village and procured a common kitten, which I put into the basket with the other. There was a great deal of spitting and growling at first, but in time they became great friends, but the villager was no match for the forester. It was amusing to see the wild one dart like a squirrel up the walls of the tent on to the roof; the other would try to follow, scramble up a few feet, and then, hanging by its claws, look round piteously before it dropped to the ground.

No. 212. FELIS TORQUATA.

The Spotted Wild-Cat (*Jerdon's No.* 114).

NATIVE NAME.—*Lhan-rahn-manjur*, Mahrathi.

HABITAT.—North-Western, Central, and Southern India.

DESCRIPTION.—Ground colour pale greyish fulvous or cat-grey, with numerous round black spots, smaller on the head, nape, and shoulders; longitudinal lines on the occiput; cheek striped; breast spotted, but belly free from spots; on the limbs distinct cross bands; within the arms one or two broad black streaks; tail tapering more or less, and marked with a series of well-defined rings and a black tip; smallish ears, as in the domestic cat, reddish outside with a small dusky tuft at tip; paws black underneath.

SIZE.—Head and body, from 16 to 24 inches; tail, about half the length.

Blyth first obtained this from Hansi, where it was stated to frequent open sandy plains, living on field rats. Jerdon at Hissar and in the Central Provinces. At Hissar he found it among low sand-hills, where it appeared to feed on the jerboa-rat (*Gerbillus indicus*), which is common there. Sykes seems to have confused this species with a domestic variety run wild, as the habits differ from the present species.

No. 213. FELIS MANUL.

The Black-chested Wild-Cat.

HABITAT.—Tibet, Central and Northern Asia.

DESCRIPTION.—Rufescent pale grey; chest and front of neck and part of belly sooty black, "terminating forward near the ears horn-wise

crescent-wise; on the crown of the head several series of black dots are disposed more or less linearly and length-wise. On the cheeks, from eyes to articulation of jaws, are two sub-parallel zig-zag lines of jet black; five to seven straighter lines, less deep in hue, cross the lower back and blend gradually with the caudal rings, which, including the black tip, are about nine in number. These rings of the tail are narrow, with large intervals, diminishing towards its tip, as the interstices of the dorsal bars do towards the base of the tail; the black caudal rings are perfect, save the two basal, which are deficient below, whilst the two apical on the contrary are rather wider below and nearly or quite connected there. Outside the arms and sides are two or three transverse black bars, more or less freckled with the grey hairs of the body; ears outside grey, like the back, but paler, small and much rounded. The young show the marks more clearly" (*Blyth*, abridged from *Hodgson*).

SIZE.—Head and body, 22 to 24 inches: tail, 10 to 11 inches.

This animal which is allied to the European wild-cat, was first discovered by Pallas, who, however, has left little on record concerning its habits beyond that it is found in woody rocky countries preying on the smaller quadrupeds.

No. 214. FELIS SCRIPTA.

HABITAT.—Thibet.*

No. 215. FELIS SHAWIANA.

The Yarkand Spotted Wild-Cat.

NATIVE NAME.—*Molun*, Turki.

HABITAT.—Turkistan, Yarkand.

DESCRIPTION.—"General colour pale greyish fulvous above, the back rather darker than the sides; under parts white; the body marked throughout with rather small black spots which are largest on the abdomen, smaller and closer together on the shoulders and thighs, tending to form cross lines on the latter, and indistinct on the middle of the back; anterior portion of the face and muzzle whitish; cheek stripes of rusty red and black; hairs mixed; ears rather more rufous outside, especially towards the tip, which is blackish brown and pointed; the hairs at the end scarcely lengthened; interior of ears white; there are some faint rufous spots at the side of the neck; breast very faintly rufous, with one narrow brownish band across; inside of limbs mostly white; a black band inside the forearm, and a very black spot behind the tarsus; tail dusky above near the base, with five or six black bars above on the posterior half, none below, the dark bars closer together

* Milne-Edwards describes this animal in his 'Recherches sur les Mammifères,' page 341.

wards the tip; fur soft, moderately long, purplish grey towards the base."

SIZE.—Apparently exceeds that of the common cat, and equals *F. chaus*; the tail about half the length of the body.

I have taken the above description from Mr. W. T. Blanford ('Report on the Second Yarkand Mission: Mammalia') who has first described and named this new species. There is also an excellent plate in the same portion of the report, which unfortunately is published at an almost prohibitive price, and to be obtained at the Government Press. The black spots on the belly have been inadvertently left out; otherwise the plate is excellent, as are all the others, especially the osteological ones.

No. 216. FELIS CHAUS.

The Common Jungle-Cat (*Jerdon's No.* 115).

NATIVE NAMES.—*Kutas* (according to Jerdon, but I have always found this applied to the *Paradoxurus*), *Jangli-billi*, *Ban-bilao*, Hindi; *Ban beral*, Bengali; *Birka*, Bhagalpor Hill Tribes; *Maut-bek*, Canarese; *Kada-bek* or *Bella-bek* of Waddars; *Mota lahn manjur*, Mahrathi; *Bhaoga* Mahrathi of the Ghats; *Jinki-pilli*, Telegu; *Cheru-pali*, Malabarese (*Jerdon*); *Khyoung-Tsek-koon* in Arakan.

HABITAT.—Common all over India from 7,000 or 8,000 feet of elevation in the Himalayas, down to Cape Comorin and the Island of Ceylon. It is also found in Assam and Burmah. This species appears to have a wide range, as it has been found also in Persia, on the borders of the Caspian and in Egypt.

DESCRIPTION.—Larger somewhat, and more lanky than the domestic cat. The general appearance of the fur a rusty or grizzly grey; the hairs being pale fulvous brown with dark tips; more rufous on the sides of the abdomen and neck, the lower parts being white; faint transverse stripes, occasionally broken into spots on the sides, but these markings disappear with old age, and are more difficult to trace in the deeper furred specimens from cold countries; the markings are darker on the limbs, and there is a distinct black bar on the forearm near the elbow; inside are two or three dark stripes; the feet are blackish underneath; often a dark bar across the chest, and sometimes faint spots on the belly; rufous stripes on the cheek; a dark stripe ascends from the eye, especially in the young animal, and it has sometimes faint stripes on the nape mingling on the forehead; the ears are slightly tufted, dark externally, white within; the tail, which is short, is more or less ringed from the middle to the tip, which is black. Melanoid specimens have been found.

SIZE.—Head and body, about 26 inches; tail, nine to ten; height at shoulder, 14 to 15 inches.

This rather common cat is, in some degree, related to the lynxes, sufficiently distinct, yet resembling the latter in its tufted ears, short tail, long limbs, and some few peculiarities of the skull.

Jerdon says of it: "It frequents alike jungles and the open country, and is very partial to long grass and reeds, sugar-cane fields, corn fields, &c. It does much damage to game of all kinds—hares, partridges, &c., and quite recently I shot a pea fowl at the edge of a sugar-cane field when one of these cats sprang out, seized the pea fowl, and after a short struggle (for the bird was not dead) carried it off before my astonished eyes, and in spite of my running up, made good his escape with his booty. It must have been stalking these birds, so immediately did its spring follow my shot." Blyth writes: "In India the *chaus* does not shun, but even affects populous neighbourhoods, and is a terrible depredator among the tame ducks and poultry, killing as many as it can get at, but I have not known him to attack geese, of which I long kept a flock out day and night, about a tank where ducks could not be left out at night on account of these animals. A pair of them bred underneath my house, and I frequently observed them, and have been surprised at the most extraordinary humming sound which they sometimes uttered of an evening. Their other cries were distinguishable from those of the domestic cat." This species will, however, interbreed with the domestic cat. According to Hodgson it breeds twice a year in the woods, producing three or four kittens at a birth. It is said to be untameable, but in 1859, at Sasseram, one of the men of my Levy caught a very young kitten, which was evidently of this species. I wrote at the time to a friend about a young mongoose which I had just got, and added, "It is great fun to see my last acquisition and a little jungle cat (*Felis chaus*) playing together. They are just like two children in their manner, romping and rolling over each other, till one gets angry, when there is a quarrel and a fight, which, however, is soon made up, the kitten generally making the first advances towards a reconciliation, and then they go on as merrily as ever. The cat is a very playful, good tempered little thing; the colour is a reddish-yellow with darker red stripes like a tiger, and slightly spotted; the ears and eyes are very large; the orbits of the last bony and prominent. What is it? *Chaus* or *Bengalensis*?* I am not as yet learned in cats when very young. If it be a real jungle cat—which my shikaris declare it to be—it strangely belies the savage nature of its kind, as Thomson says:—

'The tiger darting fierce
Impetuous on the prey his glance has doom'd
The lively shining leopard speckled o'er
With many a spot the beauty of the waste
And scorning all the taming arts of man.'

* Both reputed to be untameable.

"Poets are not always correct. Tigers have often been tamed, though they are not to be depended on."

Now we come to the true Lynxes, which are cats with very short tails, long limbs, tufted ears, the cheeks whiskered almost as long as Dundreary's, and feet the pads of which are overgrown with hair. Some naturalists would separate them from the other cats, but the connection is supplied by the last species which, though possessing certain features of the lynx, yet interbreeds with the true cats. The lynx was well known to the ancients, and was one of the animals used in the arena from its savage disposition, and its sight was considered so piercing as to be able to penetrate even stone walls! There are no true lynxes in India proper; we must look to the colder Trans-Himalayan countries for them. The following is from Thibet:—

No. 217. FELIS ISABELLINA.

The Thibetan Lynx.

HABITAT.—Thibet.

DESCRIPTION.—"Pale isabella-brown, with scarcely a trace of markings, but in some the spots come out even conspicuously in summer *pelage*, especially on the limbs and belly, and the crown and middle of the back are generally more or less infuscated, occasionally very much so; in some the face is almost white, with traces of frontal streaks, and there is always (the same as in the European lynx) a short, narrow, dark streak on each side of the nose towards its tip."—*Blyth.*

This species is similar in some respects to the European animal, but the principal difference lies in the feet, the pads of which in the Thibetan species are prominent and bare, with short, close fur between them, whereas in the European lynx the long fur completely conceals the pads, and the latter is the larger animal. There is a very good photograph of *F. isabellina* in Kinloch's 'Large Game Shooting in Thibet and the North-West,' taken from a carefully stuffed specimen. The author says: "On the 4th of July 1866, I was hunting *Ovis Ammon* on the high ground between Hanle and Nyima, when I suddenly came upon a female lynx with two young cubs. I shot the mother, and as the cubs concealed themselves among some rocks, I barricaded them in, and went on with my hunting. On arriving in camp I sent men back to try and catch the cubs; in this they succeeded, and brought them to me. They were about the size of half grown cats, and more spiteful vicious little devils cannot be imagined; they were, however, very handsome, with immense heads and paws. For two or three days they refused all food; but at the end of that time they fed quite ravenously from the hand. They soon became very tame and playful,

though always ready to set their backs up if at all teased, or if a dog came near them."

The next species differs from the typical lynx in wanting the ruff of hair round the face, and also in having the pads of the feet bald. The skull is that of a lynx, but the processes of the frontals and intermaxillæ are not quite so much produced, and they do not entirely separate the nasal from the maxillæ. There is a good illustration to be found in De Blainville's 'Ostéographie.'

No. 218. FELIS CARACAL.

The Red Lynx (Jerdon's No. 116).

NATIVE NAME.—*Siagosh*, Persian, i.e., black ear.

HABITAT.—Scattered throughout India generally, Assam (Burmah and Ceylon ?), but it has also a much wider range, being found throughout Africa, Syria, and Arabia, and also in Persia.

DESCRIPTION.—Colour sandy fulvous, varying somewhat in individuals; paler beneath, in some almost white; tail the same colour as the body, with a black tip; the lower parts with some obscure spots, more or less distinct on the belly, flanks and insides of limbs; ears black externally, with a long dark ear tuft, white inside; a small blackish spot on the upper lip, and another above the eye, also a line down each side of the nose. In some individuals faint bars and caudal rings are discernible, and the chest is obscurely banded.

SIZE.—Head and body, 26 to 30 inches; tail, 9 or 10; height, 16 to 18 inches.

This handsome lynx is found, though not very common, in most parts of the Indian Peninsula, although Jerdon states that it is unknown in the Himalayas, Bengal, and the eastern countries. In those parts where it abounds it is very destructive to small game, such as gazelles, the smaller deer and hares. It also catches such birds as pea-fowl, florican, cranes, &c., frequently springing at them from the ground as they fly over. They are easily tamed. I had a young one at Seonee, and the natives of some parts are said to train them for sporting purposes in the manner in which the hunting leopard is trained.

Blyth says a brace of siagosh are often pitted against each other by the natives who keep them, a heavy wager pending as to which of the two will disable the greater number out of a flock of tame pigeons feeding, before the mass of them can rise out of reach, and ten or a dozen birds are commonly struck down right and left.

"It is a most sanguinary creature, yet the keepers manage them with facility, and slip the hood over their eyes with extreme dexterity, while they are engaged with their prey. In general they become quite tame to persons they know, and often sufficiently so to bear handling by a

stranger. Much as I have seen of them I never heard one utter a sound, except hissing and growling."

With regard to this last assertion of Mr. Blyth's I may say that the caracal differs very much from the European lynx, who, according to Tschudi, betrays his presence by horrible howlings audible at a great distance. Professor Kitchen Parker writes that the specimen now in the Zoological Gardens is a most cantankerous beast.* "If the American

Felis caracal.

lynx, who is unfortunate enough to live in the same cage with him, dares to come betwixt the wind and his nobility, or even if he, in the course of his peregrinations, should, by chance, get sufficiently near his companion to be annoyed with the sight of so vulgar a beast, he immediately arches his back, lays back his ears, uncovers his great canines, and swears in a most fearful manner until the other unlucky animal is quite cowed, and looks as meek as its feline nature will allow it, evidently deprecating the anger of my lord; and although not

* I can bear witness to this, having lately made his acquaintance.

conscious of having done wrong, quite ready to promise faithfully never to do it again."

We now take up the last member of the Cat family; one differing so much in certain respects as to have been classed by some authors as a separate genus, to which Wagner gave the name of *Cynælurus*, or dog-cat, which, however, is not appropriate, as the animal, though having the slender form of the greyhound, and in having the claws of its middle front toes but imperfectly retractile, is, in its anatomy and all osteological features, a true cat. As I have before remarked it is to this animal alone that the name leopard should be applied, the peculiar ruff or shagginess of hair on the neck having given rise to the ancient superstition that this animal was a cross between the lion and the pard, whence its name Leo-Pardus. There are three varieties found in Africa and India—one, the maneless leopard, is confined to Africa, where also is found in the south a woolly variety with light brown spots. The maned leopard is found all over South-West Asia, including India.

No. 219. FELIS JUBATA.

The Hunting Leopard (*Jerdon's No.* 117).

NATIVE NAMES.—*Chita*, Hindi; *Yuz* of the Chita-catchers; *Kenduabagh*, Bengali; *Laggar* in some parts; *Chita Puli*, Telegu; *Chircha* and *Sivungi*, Canarese.

HABITAT.—Central or Southern India, and in the North-West from Kandeish, through Scinde and Rajpootana, to the Punjab. It is also found in all Africa, with Syria and Arabia, and throughout Asia Minor. In India the places where it is most common are Jeypur in Upper India, and Hyderabad in Southern India.

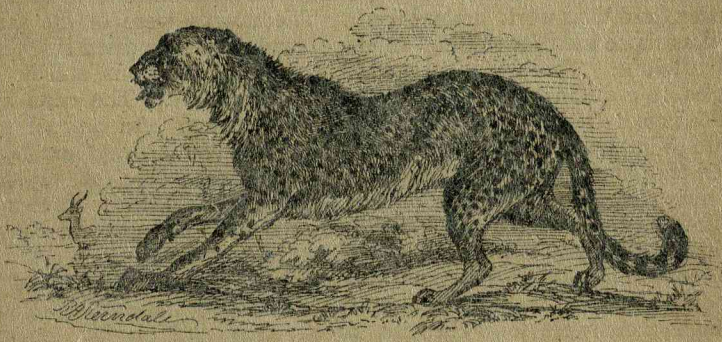
DESCRIPTION.—A tall, slim animal, with body much drawn in at the flanks like a greyhound; purely cat-like head with short round ears; long tail, much compressed at the end; in colour a bright rufous fawn, more or less deep, sometimes what Blyth calls a bright *nankeen*, dotted with numerous small black spots which are single, and not in rosettes, as in the pards; a black streak from the corner of the eye down the face; ears black at base externally, the rest whitish; the tail spotted, but having three or four black rings at the tip: the extreme tip is always white; the hair of the belly is lengthened with a shaggy

Skull of *Felis jubata*.

fringe-like appearance; the fur generally is coarse; the nozzle is black, whereas in the tiger it is pink, and in a pard dusky pink; the pupils of the eye contract circularly.

SIZE.—Head and body, about 4½ feet; tail, 2½; height, 2½ to 2¾ feet.

This animal is one of the most interesting of all the felines, both as regards its appearance, disposition, habits, and the uses to which it can be put. Throughout India it is in much request as a necessary appanage to regal state; and, therefore, a class of men devote themselves to the trapping of this creature which, when trained, finds a ready sale at the courts of Indian nobles. For this purpose the adult animal is always caught, it being considered by the chita-catchers that a young leopard would never turn out well for the purposes of the chase. A similar idea prevails amongst the falconers of Hindustan regarding nestlings, and it is surprising how soon a large adult and apparently savage animal



Felis jubata.

can be reduced to a state of comparative slavery and obedient to the orders of his keepers.

Dr. Jerdon describes one which he brought up from its earliest infancy; his bungalow was next to the one I inhabited for a time at Kampti, and consequently I saw a good deal of Billy, as the leopard was named. At my first interview I found him in the stables amongst the dogs and horses, and, as I sat down on his charpoy, he jumped up alongside of me, and laid down to be scratched, playing and purring and licking my hands with a very rough tongue. He sometimes used to go out with his master, and was gradually getting into the way of running down antelope, when Dr. Jerdon was ordered off on field service.

The mode of hunting with the chita is so well known, and has been so frequently described, that I think I need not attempt a description.

habits in a state of nature, and the mode of capture, are more to the purport of this work. It is said by shikarees to feed only once every third day, when, after gorging itself, it retires to its den for the other two. On the morning of the third day he visits some particular tree, which the animals of his species in the neighbourhood are in the habit of frequenting. Such trees are easily to be recognised by the scoring of the bark on which he whets his claws. Here, after having relieved himself in various ways and played about with such of his comrades as may be there, they go off on a hunting expedition.

There is an interesting letter from "Deccanee Bear" in *The Asian* of the 22nd of July, 1880, giving a description of the snaring of some of these animals, and the remarks he makes about their rendezvous at a particular tree, corroborates what has been asserted by other writers. He says: "Arrived at the spot the bullocks were soon relieved of their burden, and then work commenced. The nooses were of the same kind as those used for snaring antelope, made from the dried sinews of the antelope. These were pegged down in all directions, and at all angles, to a distance of 25 to 30 feet from the tree. The carts and bullocks were sent off into a road about a mile away. An ambush was made of bushes and branches some fifty or sixty yards away, and here, when the time came, I and three Vardis ensconced ourselves. I have sat near some dirty fellows in my life, but the stench of those three men baffles description; you could cut it with a knife. I could not smoke, so had to put up with the several smells until I was nearly sick. At last the sun commenced to sink, and the men who were looking round in all directions, suddenly pointed in the direction of the north. Sure enough there were four cheetahs skying away and playing together about 400 yards off; they came closer and closer, when they stopped about 100 yards off, looking about as if they suspected danger. However, they became reassured, and all raced away as hard as they could in the direction of the tree. Two were large and the other two smaller; the larger had the best of the race, and were entangled by all four feet before they knew where they were. The Vardis made a rush. I did the same, but in a second was flat on the ground, having caught my feet in the nooses. One of the men came and released me from my undignified position, and I could then see how the cheetahs were secured. A country blanket was thrown over the heads of the animal, and the two fore or hind legs tied together. The carts had come up by this time; a leather hood was substituted for the blanket—a rather ticklish operation, during which one man was badly bitten in the hand. The cheetahs know how to use their teeth and claws. Having been securely fastened on the carts, and the nooses collected, we started for camp, which we reached about eight in he evening. I was much pleased

with what I had seen and learnt, but it took me a long time to get the smell of the Vardis out of my head. The next morning I went to see the cheetahs and found that they had been tied spread-eagle fashion on the carts, and with their hoods firmly tied. They were a pair, and in all probability the parents of the two smaller ones. Women and children are told off to sit all day long close to the animals, and keep up a conversation, so that they should get accustomed to the human voice. The female was snarling a good deal, the male being much quieter; they go through various gradations of education, and I was told they would be ready to be unhooded and worked in about six months' time. The man who had his hand bitten was suffering from considerable inflammation. I had him attended to, and, after rewarding them with 'baksheesh,' I let them proceed on their way rejoicing."

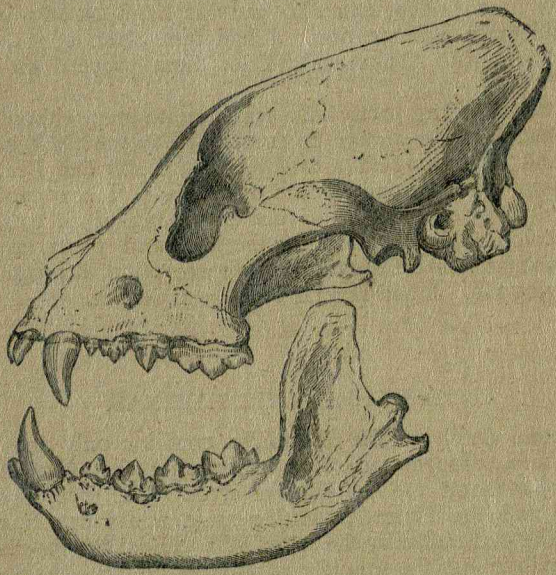
Chita kittens are very pretty little things, quite grey, without any spots whatever, but they can always be recognised by the black stripe down the nose, and on cutting off a little bit of the soft hair I noticed that the spots were quite distinct in the under fur. I have not seen this fact alluded to by others. As a rule the young of all cats, even the large one-coloured species, such as the lion and puma, are spotted, but the hunting leopard is externally an exception, although the spots are there lying hid. I had several of them at Seonee.

HYÆNIDÆ—THE HYÆNAS.

The second family of the Æluroidea contains only one genus, the *Hyæna*, which, though somewhat resembling the dog in outward appearance, connects the cat with the civet. The differences between the *Felidæ* and the *Viverridæ*, setting aside minor details, are in the teeth, and the possession by the latter of a caudal pouch. My readers are now familiar with the simple cutting form of the feline teeth, which are thirty in number. The civets have no less than forty, and the grinders, instead of having cutting scissor-like edges, are cuspidate, or crowned with tubercles. Now the hyæna comes in as an intermediate form. He has four more premolars than the typical cat, and the large grinding teeth are conical, blunt and very powerful, the base of the cone being belted by a strong ridge, and the general structure is one adapted for crushing rather than cutting. Professor Owen relates that an eminent engineer, to whom he showed a hyæna's jaw, remarked that the strong conical tooth, with its basal ridge, was a perfect model of a hammer for breaking stones.

Of course, such a formation would be useless without a commensurate

native power, and we may, therefore, look to the skull for certain signs of the enormous development of muscles, which this animal possesses. In shape it somewhat resembles the cat's skull, though not so short, nor yet so long as that of the civet or dog. The zygomatic arches are greatly developed, also the bony ridges for the attachment of the muscles, especially the sagittal or great longitudinal crest on the top of the head, which is in comparison far larger than that of even the tiger, and to which are attached the enormous muscles of the cheek working the powerful jaws, which are capable of crushing the thigh-bone of a



Skull of Hyæna.

bullock. Captain Baldwin, in his book, says he remembers once, when watching over a kill, seeing a hyæna, only some twelve feet below where he sat, snap with a single effort through the rib of a buffalo.

The hyæna also possesses the sub-caudal pouch of the civets, which gave rise amongst the ancients to various conjectures as to the dual character of its sex.

The *bulla tympani* or bulb of the ear is large as in the cats, but it is not divided into two compartments by a bony partition (which in the dogs is reduced to a low wall), but the paroccipital process or bony

clamp on the external posterior surface is closely applied to the bulb as in the cats, and not separated by a groove as in the dogs.

The cervical vertebræ sometimes become anchylosed, from whence, in former times, arose the superstition that this animal had but one bone in the neck.

In its internal anatomy, digestive as well as generative, the hyæna is nearer to the cat than the dog, but it possesses the *cæcum*, or blind gut, which is so large in the canidæ, small in the felines, and totally absent in the bears.

The tongue is rough, with a circular collection of retroflected spines. The hind legs are much shorter than the front, and the feet have only four toes with blunt worn claws, not retractile, but like those of the dog.

The hair is coarse and bristly, and usually prolonged into a sort of crest or mane along the neck and shoulders, and to a slighter degree down the back; the tail is bushy.

Dental formula: Inc., $\frac{3-3}{3-3}$; can., $\frac{1-1}{1-1}$; pre-molars, $\frac{4-4}{3-3}$; molars, $\frac{1-1}{1-1}$.

There are only three known species of hyæna, of which one, our common Indian animal, belongs to Asia, and two, *H. crocuta* and *H. brunnea*, to Africa.

No. 220. HYÆNA STRIATA.

The Striped Hyæna (*Jerdon's No.* 118).

NATIVE NAMES.—*Taras*, *Hundar*, *Jhirak* (in Hurriana); *Lakhar-baghar*, *Lokra-bagh*, Hindi; *Naukra-bagh*, Bengali; *Rerha* in Central India; *Kirba* and *Kat-Kirba*, Canarese; *Korna-gandu*, Telegu.

HABITAT.—All over India; but as far as I can gather not in Burmah nor in Ceylon; it is not mentioned in Blyth's and Kellaart's catalogues. It is also found in Northern Africa and throughout Asia Minor and Persia; it is common in Palestine.

DESCRIPTION.—Pale yellowish-grey, with transverse tawny or blackish bands which encircle the body, and extend downwards on to the legs. The neck and back are maned.

SIZE.—Head and body, 3½ feet; tail, about 1½ feet.

This repulsive and cowardly creature is yet a useful beast in its way. Living almost exclusively on carrion, it is an excellent scavenger. Most wild animals are too active for it, but it feeds on the remains left by the larger felines, and such creatures as die of disease, and can, on a pinch, starve for a considerable time. The African spotted hyæna is said to commit great havoc in the sheep-fold. The Indian one is very destructive to dogs, and constantly carries off pariahs from the outskirts of villages. The natives declare that the hyæna tempts the dogs out by its unearthly cries, and then falls upon them. Dr. Jerdon relates a story of a small dog belonging to an officer of the 33rd M. N. I. (the

giment he was with when I first knew him) being carried off by a hyæna whose den was known. Some of the sepoys went after it, entered the cave, killed the hyæna, and recovered the dog alive, and with but little damage done to it.

The hyæna is of a timorous nature, seldom, if ever, showing fight. Two of them nearly ran over me once as I was squatting on a deer run waiting for sambar, which were being beaten out of a hill. I flung my hat in the face of the leading one, on which both turned tail and fled. The Arabs have a proverb, "As cowardly as a hyæna."

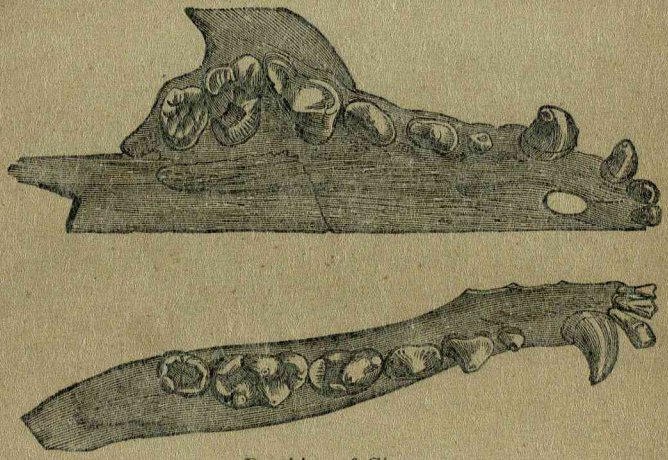
The *Cryptoprocta ferox* is not an inhabitant of India, being found only in the interior of Madagascar. The genus contains only one species, a most savage little animal; it is the most perfect link between

Hyæna striata.

the cats and the civets, having retractile claws, one more premolar in each jaw; five toes, and semi-plantigrade feet. It should properly come before the hyænas, to which the next in order is the South African Aard-wolf (*Proteles Lalandii*), which forms the connection between the hyæna and the civet, though more resembling the former. It is placed in a family by itself, which contains but one genus and species. It has the sloping back of the hyæna, the hind legs being lower than the fore, and it might almost, from its shape and colouring, be taken for that animal when young. The skull however is prolonged, and the teeth are civet-like. It is nocturnal and gregarious, several living in the same burrow. Like the hyæna it lives on carrion. It has a fifth toe on the fore feet.

VIVERRIDÆ—THE CIVET FAMILY.

The Civets are confined to the Old World; they are mostly animals with long bodies, sharp muzzle, short legs, long tapering tail and coarse fur; they are semi-plantigrade, walking on their toes, but keeping the wrist and ankle nearer to the ground than do the cats; the claws are only partially retractile; the skull is longer in the snout than that of felines, and, altogether narrower, the zygomatic arches not being so broad, the base of the skull is much the same, and the *bulla tympani* shews little difference; the teeth, however, are decidedly different. There



Dentition of Civet.

are four premolars and two molars on each side of each jaw, which, with the normal number of canines and incisors, give forty teeth in all; the canines are moderate in size, and sharp; the premolars conical, and the molars cuspidate, which gives them a grinding surface instead of the trenchant character of the cats; the tongue is rough, the papillæ being directed backwards; the pupils are circular. The most striking characteristics of the family is, however, the sub-caudal pouch, which in most produces an odorous substance, and in the typical civet the perfume of that name.

Dental formula: inc., $\frac{3-3}{3-3}$; can., $\frac{1-1}{1-1}$; premolars, $\frac{4-4}{3-3}$; molars $\frac{2-2}{3-3}$

The family contains the Civet, Genette, Linsang, Suricate, Binturong and Mongoose, though this last is separated by Jerdon, who follows Blyth.

GENUS VIVERRA.

Anal pouch large, and divided into two sacs secreting the *civet* perfume of commerce; pupil vertical and oblong; fur spotted and coarse, lengthened into an erectile mane on the back; diet mixed carnivorous and vegetivorous.

No. 221. VIVERRA ZIBETHA.

The Large Civet Cat (Jerdon's No 119).

NATIVE NAMES.—*Katas*, Hindi; *Mach-bhondar*, Bengali, also *Bagdos* and *Pudo-gaula* in some parts; *Bhran* in the Nepal Terai; *Nit-biralu*,

Viverra zibetha.

Nepalese; *Kung*, Bhotia; *Saphiong*, Lepcha, (*Jerdon*); *Khyoung-myen*, Aracanese.

HABITAT.—According to Jerdon this species inhabits Bengal, extending northwards in Nepal and Sikhim, and into Cuttack, Orissa, and Central India on the south, but is replaced in Malabar by the next species; it is also found in Assam and Burmah, but apparently not in Ceylon, where *V. Malaccensis* represents the family.

DESCRIPTION.—Hoary or yellowish grey, generally spotted and striped with black; some specimens are marked with wavy bands, others are almost free from marks; throat white, with a transverse black band, another on each side of the neck; under-parts white; tail with six black rings; limbs dark.

SIZE.—Head and body, 33 to 36 inches; tail 13 to 20.

"This animal frequents brushwood and grass, and the thorny scrub that usually covers the bunds of tanks. It is very carnivorous and destructive to poultry, game, &c., but will also, it is said, eat fish, crabs and insects. It breeds in May and June, and has usually four or five young. Hounds, and indeed all dogs, are greatly excited by the scent of this civet, and will leave any other scent for it. It will readily take to water if hard pressed."—*Jerdon.*

The drug civet is usually collected from the glands of this and other species, which are confined for the purpose in cages in which they can hardly turn round, and it is scraped from the pouch with a spoon. Sometimes the animal rubs off the secretion on the walls and bars of its cage, which are then scraped; but the highest price is given for the pouch cut from the civet when killed. In the London Zoological Gardens the collection of the perfume, which is rubbed off against the walls of the cage, is a valued perquisite of the keeper. Cuvier says of a civet which was kept in captivity in Paris: "Its musky odour was always perceptible, but stronger than usual when the animal was irritated; at such times little lumps of odoriferous matter fell from its pouch. These masses were also produced when the animal was left to itself, but only at intervals of fifteen to twenty days."

No. 222. VIVERRA CIVETTINA.

The Malabar Civet-Cat (Jerdon's No. 120).

HABITAT.—Throughout the Malabar coast, abundant in Travancore, and found occasionally in the uplands of Wynaad and Coorg.

DESCRIPTION.—Hair long, coarse, and of a dusky or brownish-grey, and marked with interrupted transverse bands or spots in rows, two obliquely transverse black lines on the neck; the snout, throat, and neck are white; the tail tinged with black. From the shoulders along the back a mane or crest of lengthened hair.

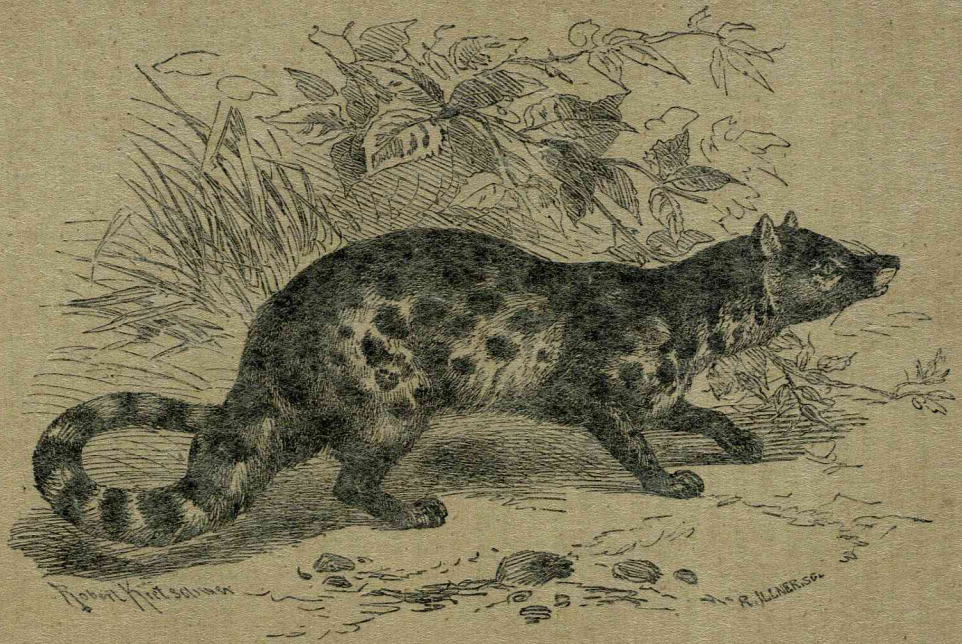
SIZE.—Same as last species.

This species closely resembles the African civet—only that in the latter the mane begins on the occiput. Jerdon supposes that it may be found in Ceylon, but it is not mentioned by Kellaart. It is found chiefly in forests and richly-wooded lowlands, and is stated to be very destructive to poultry. The young may, however, be reared on farinaceous food, with the addition of a little fish and raw meat; when older on flesh alone.

No. 223. VIVERRA MEGASPILA.

NATIVE NAME.—*Khyoung-myen.*

HABITAT.—Burmah, also Malayan peninsula and archipelago (?)



VIVERRA MEGASPILA.

DESCRIPTION.—The body markings larger, blacker and fewer in number than in last species.

SIZE.—Same as last.

Blyth states that this is nearly allied to the last species, but differs from *V. tangalunga* of Sumatra (with which some consider it synonymous) as the latter is smaller, with a more cat-like tail, and more numerous spots. Gray says that *V. tangalunga* has the tail black above and ringed on the lower side.

The next species is smaller and more vermiform, with acute compressed claws, a shorter tail, and no crest, and of more scansorial habits. It forms the sub-genus *Viverricula* of Hodgson, but it is not desirable to perpetuate the sub-division.

No. 224. VIVERRA MALACCENSIS.

The Lesser Civet-Cat (Jerdon's No. 121).

NATIVE NAMES.—*Mushak-billi, Katas, Kasturi*, Hindi; *Gando-gaula, Gandha-gokul*, Bengali; *Jowadi-manjur*, Mahrathi; *Punagin-bek*, Canarese; *Punagu-pilli*, Telegu; *Saver, Bug-nyul*, Nepalese; *Wa-young-kyoung-bank*, Aracanese; *Kyoung-ka-do*, Burmese; *Ooralawa*, Singhalese.

Viverra Malaccensis.

HABITAT.—India generally, with Assam, Burmah, and Ceylon. It extends also to the Malayan countries, Java and China.

DESCRIPTION.—General colour greyish-brown, spotted black; the dorsal spots elongated, and forming longitudinal interrupted streaks or stripes on the back and croup; the sides and limbs have also spots in

lines; a long black streak from ear to shoulder, and some transverse lines on the sides of the neck. Abdomen nearly spotless; feet and part of legs dusky-brown; tail long and tapering, marked with eight or nine black rings.

SIZE.—Head and body, 22 to 24 inches; tail, 16 to 17 inches.

According to Jerdon, "it lives in holes in the ground or in banks, occasionally under rocks or in dense thickets, now and then taking shelter in drains and out-houses." Hodgson says: "These animals dwell in forests or detached woods and copses, whence they wander freely into the open country by day (occasionally at least) as well as by night. They are solitary and single wanderers, even the pair seldom being seen together, and they feed promiscuously upon small animals, birds' eggs, snakes, frogs, insects, besides some fruits or roots. In the Terai a low caste of woodmen, called Mushahirs, eat the flesh." Mr. Swinhoe affirms that the Chinese also eat its flesh, and adds: "but a portion that I had cooked was so affected with the civet odour that I could not palate it." The fur is valued in China as a lining for coats, and is bought by those who cannot afford the more expensive skins. Jerdon had one which was perfectly tame; it caught rats and squirrels at times, as also sparrows and other birds. It is kept alive by the natives in India and Ceylon for the sake of the secretion. Kellaart says it is a great destroyer of poultry, and that it will enter a yard in daylight and carry off a fowl or a duck. It is much dreaded by the Chinese for the havoc it commits in the hen-roost.

GENUS PRIONODON.

Between the last genus and this should come the *Genets*, which are not found in India, but chiefly in Africa, and one species is common in the south of Europe, where in some parts it is domesticated for the purpose of catching mice. It has rudimentary pouches only, which do not yield the musky secretion of the civets. The Linsang or *Prionodon* is a very cat-like animal, which was once classed with the Felidæ; the body is long and slender; the limbs very short; fur soft, close and erect, very richly coloured and spotted with black; the grinders are tubercular; claws retractile; soles furred; tail long, cylindrical, and ringed with black; no sub-caudal pouch. The female has two pectoral and two inguinal mammæ. Teeth, 38; molars, $\frac{5-5}{6-6}$.

No. 225. PRIONODON PARDICOLOR.

The Tiger Civet or Linsang (*Jerdon's No.* 122).

NATIVE NAME.—*Zik-chum*, Bhotia; *Suliyu*, Lepcha.

HABITAT.—Nepal, Sikim.

DESCRIPTION.—"Rich orange buff or fulvous, spotted with black; the neck above with four irregular lines; the body above and on the sides with large, entire elliptic or squarish marks, eight in transverse, and seven in longitudinal series, diminishing in size on the dorsal ridge, which has an interrupted dark line, and extending outside the limbs to the digits; below entirely unspotted; tail with eight or nine nearly perfect and equal rings" (*Jerdon*). "Skull elongate; nose rather short, compressed; brain-case narrow in front, swollen over the ears, and contracted and produced behind; orbits, not defined behind, confluent with the temporal cavity; zygomatic arch slender; palate contracted behind" (*Gray*). Jerdon's description is a very good one, but it must not be taken as an accurate one, spot for spot, for the animal varies somewhat in colour. Take, for instance, a description from Gray: "Pale *whitish grey*; back of neck and shoulders with *three* streaks diverging from the vertebral line; back with two series of large square spots; the shoulders, sides, and legs with round black spots; an elongated spot on the middle of the front part of the back, between the square spots on the sides of the body."

SIZE.—Head and body, 16 inches; tail, 14 inches; height, 6 inches.

Our Indian animal is closely allied to the Malayan species, which was first described as *Felis* and afterwards *Prionodon gracilis*. It is mentioned in the English translation of Cuvier as the delundung, "a rare Javanese animal, of which there is only one species," but another was subsequently found by Mr. Hodgson in Nepal, and now a third has been discovered in Tenasserim. They are beautiful little creatures, with all the agility of cats, climbing and springing from branch to branch in pursuit of small mammals and birds, and I have no doubt it is a great enemy of the *Tupaiæ* and squirrels. It breeds in the hollows of trees. It is capable of being tamed, and according to several authors becomes very gentle and fond of being noticed.

Hodgson says it never utters any kind of sound. He fed his on raw meat.

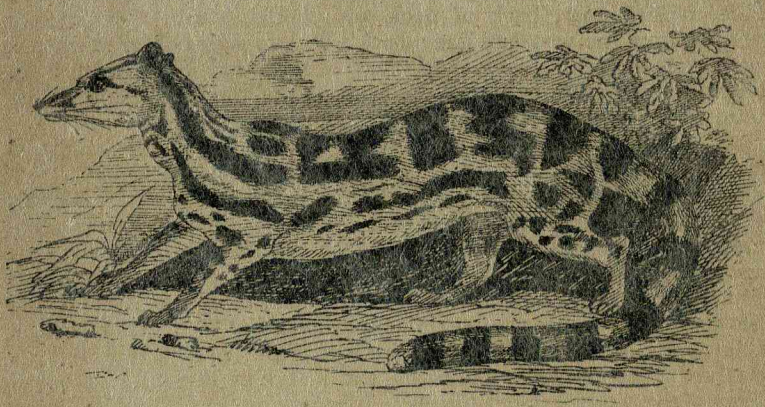
No. 226. PRIONODON MACULOSUS.

The Spotted Linsang.

HABITAT.—Tenasserim.

DESCRIPTION.—"Upper part brownish-black, broken up by greyish-white bands, lower parts white; tail brownish-black, with seven white rings; tips whitish; two broad black bands run down each side of the upper part of the neck, between them is a narrow greyish-white band with a faint mesial dark streak somewhat interrupted, and passing into two bands of elongate spots between the shoulders. The two broad dark bands pass into the dark patches on the back; on each side of

these bands is a white rather wavy stripe, commencing at the ear, and continued along the neck above the shoulder and down the side to the thighs, becoming more irregular behind; below this again is a dark band somewhat broken up into spots in front, passing over the shoulder and continued as a line of large spots along the side. The back is chiefly brownish-black, crossed by six narrow transverse whitish bands, the first five equidistant, the foremost communicating with the mesial neck band, and the hinder all uniting with the white band on the side, so as to break up the dark colour into large spots. There are small spots on the fore neck, lower portion of the sides, and outside of the limbs, the spots in the neck forming an imperfect gorget. The white rings on the tail are not much more than half the breadth of the dark



Prionodon maculosus.

rings; the last ring near the tip and the first white ring are narrower than the others; nose dark brown mixed with grey; a dark ring round each orbit, with a streak running back to below the ear, and another passing up to the crown; forehead between and behind the eyes and in front of the ears and cheeks pale grey; ears rounded and clad with blackish hairs outside and near the margin inside, a few long pale hairs on the inner surface of the ear conch; whiskers long, extending to behind the ears, the upper brown, the lower entirely white; soles, except the pads, which are naked, covered with fine hair." The above careful description is by Mr. W. T. Blanford on specimens collected by Mr. Davison in Burmah. Mr. Davison lately showed me a beautiful specimen, which I should describe by a reverse process to Mr. Blanford's, taking the light colour as the ground work, and stating it to

of a yellowish-white or pale buff, with broad black bands and blotches as above described, or in general terms broad black patches over the back, two longitudinal interrupted black bands along the neck and sides, with two lines of elongated spots above and below the lower band, and numerous small spots on the throat, chest and limbs.

SIZE.—Head and body, 18¼ inches; tail, 16 inches without the hair, 16¾ with it.

This is a larger animal than *P. pardicolor*, and is distinguished from it by its larger marking. The fur is beautifully soft and close. From the richness of its colouring, the elegance of its shape, and the agility of its movements, it is one of the most beautiful and interesting of our smaller mammals.

No. 227. PRIONODON GRACILIS.

The Malayan Linsang.

HABITAT.—Malacca, Siam, Sumatra, and Tenasserim.

DESCRIPTION.—Fur white. back with broad black cross-bands, sides of neck with a broad black streak continued along the sides of the body, confluent with the bands of the neck; back of neck with five parallel black streaks; tail with seven black and white streaks; a second streak, broken into spots, from the side of the neck to the haunches; legs with small black spots.

Very similar to the last, only somewhat smaller.

Between *Prionodon* and the next comes a genus *Hemigalea*, which contains one species, *H. Hardwickii*, inhabiting the Malay countries. It is a perfect link between *Prionodon* and *Paradoxurus*.

GENUS PARADOXURUS—THE MUSANGS.

Paradoxurus is a misnomer, signifying *queer-tailed*, which originated in an abnormal twist in the tail of the specimen first described and named by M. F. Cuvier. I do not think that it is even occasional, as stated by some naturalists, but is of comparatively rare occurrence; and such deformities are by no means confined to this genus only.

The tail can be rolled up towards the end, and the hair is occasionally worn off, and some have a habit of curling it sideways; but I have never seen one as described by Kellaart when speaking of the genus: "The extreme or more distant half being, when extended, turned over so that the lower side is uppermost, and the animal can roll it up spirally from above downwards, and from the extremity to the base."

In general appearance the musang resembles the civet, and it has

in some species a sub-caudal glandular fold which contains a secretion, but without the musky odour of civet.

The dentition is singularly like that of the dog, save that the flesh tooth is proportionally much stouter.

The feet are five-toed, webbed; pads bald; claws semi-retractile; tail very long, with from thirty-six to thirty-eight vertebræ; the pupil of the eye is linear and erect.

No. 228. PARADOXURUS MUSANGA.

The Common Musang (Jerdon's No. 123.)

NATIVE NAMES.—*Khatas*, *Menuri* (in Southern India), *Lakati*; *Jharka-kutta*, Hindi; *Bhonar*, Bengali; *Ud*, Mahrathi; *Kera-bek*, Canarese; *Manupilli*, Telegu; *Marra-pilli*, Malayan (toddy-cat and tree-cat of Europeans); *Sakrala*, *Khoonla*.

HABITAT.—Throughout India, Burmah and Ceylon, extending to the Malay countries.

DESCRIPTION.—It is difficult to lay down any precise rule for the colour of this animal, for it varies much. In general it is a fulvous grey, marked or clouded with black, or with black longitudinal stripes. No two naturalists describe it exactly alike. The limbs are, however, always dark, and there is usually a dark stripe down from the top of head to the centre of the nose. I will quote a few descriptions by various authors: "General colour brownish-black, with some dingy yellowish stripes on each side, more or less distinct, and sometimes not noticeable. A white spot above and below each eye, and the forehead with a whitish band in some; a black line from the top of the head down the centre of the nose is generally observable. In many individuals the ground colour appears to be fulvous, with black pencilling or mixed fulvous and black; the longitudinal stripes then show dark; limbs always dark brown; some appear almost black throughout, and the young are said to be nearly all black" (*Jerdon*). "General colour fulvous grey, washed with black; face darker coloured, with four white spots, one above and one below each eye, the latter more conspicuous; from three to five—more or less interrupted—black lines run from shoulder to root of tail, the central one broader and more distinct than the lateral lines; some indistinct black spots on the sides and upper parts of limbs; tail nearly all black; feet black, soles bald to the heel, flesh-coloured" (*Kellaart*). "Nose brown in the centre, with the brown colour extending under the eyes; the spot under the eye is small and indistinct" (*Gray*). The last remark is reverse of what Kellaart says. The muzzle of the young animal is flesh coloured; they are said to lose their black hairs when kept long in confinement, and become generally lighter coloured.

SIZE.—Head and body about 20 to 25 inches; tail from 19 to 21 inches.

This is a very common animal in India, frequently to be found in the neighbourhood of houses, attracted no doubt by poultry, rats, mice, &c. It abounds in the suburbs of Calcutta, taking up its abode sometimes in out-houses or in secluded parts of the main building. During the years 1865-66 a pair inhabited a wooden staircase in the Lieutenant-Governor's house at Alipore (Belvedere). We used to hear them daily, and once or twice I saw them in the dusk, but failed in all my attempts to trap them. That part of the building has since been altered, so I have no doubt the confiding pair have betaken themselves to other quarters. In a large banyan-tree in my brother's garden at Alipore there is a family at the present time, the junior members of which have lately fallen victims to a greyhound, who is often on the look-out for them. As yet the old ones have had the wisdom to keep out of his way.

They are very easily tamed. I had one for a time at Seonee which had been shot at and wounded, and I was astonished to find how soon it got accustomed to my surgical operations. Whilst under treatment I fed it on eggs. In confinement it is better to accustom it to live partly on vegetable food, rice, and milk, &c., with raw meat occasionally. Its habits are nocturnal. I cannot affirm from my own experience that it is partial to the juice of the palm tree, for *toddy* (or *tari*) is unknown in the Central Provinces, and I have had no specimens alive since I have been in Bengal, but it has the character of being a toddy-drinker in those parts of India where the toddy-palms grow; and Kellaart confirms the report. It is arboreal in its habits, and climbs with great agility.

No. 229. PARADOXURUS (PAGUMA *of Gray*) GRAYII.

The Hill Musang (*Jerdon's No.* 124).

HABITAT.—South-east Himalayas and Burmah, from Nepal to Arakan.

DESCRIPTION.—"Colour above light unspotted fulvous brown, showing in certain lights a strong cinereous tinge, owing to the black tips of many of the hairs; beneath lighter and more cinereous; limbs ash-coloured, deeper in intensity towards the feet, which are black; tail of the same colour as the body, the end dark, white-tipped; ears rounded, hairy, black; face black, except the forehead; a longitudinal streak down the middle of the nose, and a short oblique band under each of the eyes, which are gray or whitish."—*Jerdon.*

SIZE.—Head and body, 30 inches; tail, 20 inches. According to Hodgson, this species keeps to the forests and mountains, feeding on small animals and birds, and also vegetable food. "One shot had only seeds, leaves, and unhusked rice in its stomach. A caged animal was

fed on boiled rice and fruits, which it preferred to animal food. When set at liberty it would lie waiting in the grass for mynas and sparrows, springing upon them from the cover like a cat, and when sparrows, as it frequently happened, ventured into its cage to steal the boiled rice, it would feign sleep, retire into a corner, and dart on them with unerring aim. It preferred birds, thus taken by itself, to all other food.

"This animal was very cleanly, nor did its body usually emit any unpleasant odour, though when it was irritated it exhaled a most fœtid stench, caused by the discharge of a thin yellow fluid from four pores, two of which are placed on each side of the intestinal aperture."

No. 230. PARADOXURUS BONDAR.

The Terai Musang (Jerdon's No. 125).

NATIVE NAMES.—*Chinghar*, Hindi; *Bondar*, *Baum*, Bengali; *Machabba* and *Malwa* in the Nepal Terai.

HABITAT.—Nepal, North Behar and Terai.

DESCRIPTION.—Clear yellow, tipped with black, the fur coarse and harsh; under fur soft and woolly; legs blackish-brown outside; body without marks, but the bridge of the nose, upper lip, whiskers, broad cheek-band, ears, chin, lower jaw, and the terminal third of the tail blackish-brown; pale yellow round the eyes; snout and feet flesh-grey; nails sharp and curved. The female smaller and paler.

SIZE.—Head and body, about 22 inches; tail, 20 to 22; skull of one 4⅓ inches, less ventricose than that of *P. Grayii*.

This species is found, like *P. musanga*, in the vicinity of houses; it lives in hollow trees, where it also breeds. Its habits are in great measure those of the common musang, though it is probably more carnivorous; it will, however, eat fruit. Jerdon says: "It sleeps rolled up like a ball, and when angered spits like a cat. It is naturally very ferocious and unruly, but capable of domestication, if taken young. It has a keen sense of smell, but less acute hearing and vision by day than the mungooses."

No. 231. PARADOXURUS TRIVIRGATUS.

The Three-striped Musang.

NATIVE NAME.—*Kyoung-na-ga*, in Arakan.

HABITAT.—Tenasserim and the Malay countries; also Assam.

DESCRIPTION.—Fur blackish-brown, slightly silvered with pale tips; three narrow black streaks down the back; under parts dirty white; head, feet, and tail black or blackish-brown. This animal forms a separate genus of Gray, following Professor Peters' *Arctogale*, on account of the smallness of the teeth and the protraction of the palate.

I had a specimen of this Paradoxurus given to me early in the cold

son of 1881 by Dr. W. Forsyth. I brought it home to England with me, and it is now in the Zoological Society's Gardens in Regent's Park. It was very tame when Dr. Forsyth brought it, but it became more so afterwards, and we made a great pet of it.

It used to sleep nearly all day on a bookshelf in my study, and would, if called, lazily look up, yawn, and then come down to be petted, after which it would spring up again into its retreat. At night it was very active, especially in bounding from branch to branch of a tree which I had cut down and placed in the room in which it was locked up every evening. Its wonderful agility on ropes was greatly noticed on board ship. Its favourite food was plantains, and it was also

Paradoxurus trivirgatus.

very fond of milk. At night I used to give it a little meat, but not much; but most kinds of fruit it seemed to like.

Its temper was a little uncertain, and it seemed to dislike natives, who at times got bitten; but it never bit any of my family, although one of my little girls used to catch hold of it by the forepaws and dance it about like a kitten. Its carnivorous nature showed itself one day by its pouncing upon a tame pigeon. The bird was rescued, and is alive still, but it was severely mauled before I could rescue it, having been seized by the neck.

No. 232. PARADOXURUS LEUCOTIS.

The White-eared Musang.

NATIVE NAME.—*Na-zwet-phyoo*, Arakanese.
HABITAT.—Burmah and Assam.
DESCRIPTION.—Fur longish, soft, and silky; upper parts tawny;

reddish-brown on back and sides; thighs, legs, throat, and belly lighter; tail long, deep chestnut brown; nose with a central white line; ears yellowish.

No. 233. PARADOXURUS ZEYLANICUS.

The Golden Musang.

NATIVE NAME.—*Coolla-weddah*, Singhalese.

HABITAT.—Ceylon.

DESCRIPTION.—A golden-brown colour arising from the longer hairs having a bright golden tint; the shorter hairs brown, paler beneath; head and legs dark brown; muzzle and lips blackish; whiskers white or yellowish; ears small, dark brown externally, almost naked internally; tail sub-cylindrical, long; sometimes with a single pale sub-terminal band; tip rounded, paler than the body. According to Kellaart, three inconspicuous brown dorsal streaks diverging and terminating on the crupper, and some very indistinct spots seen only in some lights. Gray says these animals differ in the intensity of the colour of the fur—some are bright golden and others much more brown. The latter is *P. fuscus* of Kellaart.

SIZE.—Head and body, 19 inches; tail, 15 to 16 inches.

Kellaart writes of this species: "The golden paradoxure appears to be a more frugivorous animal than the palm-cat (*Paradoxurus typus**). Their habits are alike nocturnal and arboreal. In all the individuals of the former species examined at Newera-Ellia the stomach contained Cape gooseberries (*Physalis Peruviana*†), which grow there now in great abundance; and only one had the remains of animal matter in the stomach. When young they are tolerably docile, but as they grow up their natural ferocity returns." This seems strange, as they appear to be less carnivorous than the others.

No. 234. PARADOXURUS (PAGUMA) LANIGER.

HABITAT.—Thibet.

This requires further investigation. Gray says: "This species is only known from a skin without any skull, and in a very bad state."

P. strictus, *quadriscriptus* and *prehensilis* are three species alluded to by Gray as requiring further examination, but probably Jerdon is right in considering them as varieties of *P. musanga*.

A specimen with very large canines has been reported from the Andaman Islands (*P. Tytleri* ?) in addition to these. Gray enumerates as an Indian species *P. nigrifrons*, which is likely to be a variety of

* Cuvier's name for *P. musanga*.—R. A. S.

† The *Tipari* of Bengal.—R. A. S.

musanga; it was described from a single specimen. The dorsal streaks and spots were absent, but then he says the animal had been in confinement, and, as I have said before, this tends to make the dark parts disappear.

GENUS ARCTICTIS.

This is a very curious animal, which, like the panda and the linsang, at first misled naturalists in assigning it a place. It was formerly classed with the racoons, which it superficially resembles; and, as Jerdon remarks, it may be considered as a sort of link between the plantigrade and digitigrade carnivora. The skeleton however is similar to that of the musangs as regards the great number (thirty-four) of the caudal vertebræ, but the bones of the feet have a more plantigrade character; the skull resembles that of a badger; the head is conical, with a large brain-case and acute turned-up nose; the orbit of the skull is imperfect, only defined by a prominence above; the ears are pencilled or tufted; the tail is very long, muscular and prehensile—although this was doubted by F. Cuvier, but it is now a well-known fact—and in climbing trees it is much assisted by the tail; the teeth are thirty-six in all; canines stout, upper ones long; grinders small and far apart; of the false grinders, the first and second are conical, the third compressed; the flesh-tooth is triangular, and as broad as long; the tubercular grinders are smaller than the flesh-tooth, the first triangular, the hinder cylindrical and smaller still; toes five in each foot, with powerful semi-retractile claws.

No. 235. ARCTICTIS BINTURONG.

The Binturong (*Jerdon's No.* 126).

HABITAT.—Assam, Nepal, Simla hills, also Tenasserim, Arakan, and the Malayan countries.

DESCRIPTION.—Long body, short legs, long prehensile tail, very thick at the base, and gradually tapering to a point, clad with very long bristling hair; the hair of the body very coarse; general colour, deep black, with a white border to the ears, a few brown hairs on the head and anterior surface of fore-legs. Some of the Malayan specimens are slightly sprinkled with brown, and have the head, face, and throat grizzled. It has a large sub-caudal gland, secreting an oily fluid.

SIZE.—Head and body 28 to 30 inches; tail about the same. Jerdon gives 28 to 33 inches; tail 26 to 27 inches.

According to Jerdon it is nocturnal, arboreal, and omnivorous, eating small animals, birds, insects, fruit and plants; more wild than viverrine animals in general, but easily tamed. Its howl is loud. In an illustra-

tion. I have of one of these animals, it is drawn with white patches over the eyes. Cantor says the young are marked with eye spots. I have

Artictis binturong.

added the Simla hills to the list of places it inhabits, as Mr. Hume possesses the skin of one which I have lately examined, and which was procured in this neighbourhood.

HERPESTIDÆ.

THE ICHNEUMON OR MUNGOOSE FAMILY.

A well-defined genus of animals, with long vermiform bodies, clad with long, harsh grizzled hair, long muscular tails, thick at the base, and tapering to a fine point; semi-plantigrade feet with five toes, and partially retractile claws; the eyes are small, but glittering and snake-like; the tongue rough like a cat's. Dr. Gray has divided this family into two groups, *Herpestina* and *Cynictidina*, the former containing thirteen genera, the latter one, which is separated on account of its having four toes only. Of the thirteen genera in Herpestina, we have only to do with *Herpestes*, *Calogale*, *Calictis*, *Urva*, *Tæniogale*, and *Onychogale*, which six are by most naturalists treated under *Herpestes*, and I will continue to do so, as the differences are hardly sufficient to warrant so much subdivision.

GENUS HERPESTES.

Long vermiform body; short legs with five semi-palmated toes with short compressed claws; eyes small, with linear erect pupils; long skull with forty teeth; the orbit complete in many cases, or only slightly imperfect; the hairs are long, rigid, and ringed like the quill of a porcupine, which gives the grizzled appearance peculiar to these animals. The female has only four mammæ. They are very active and sanguinary, chiefly hunting along the ground, but can climb with facility. There are several species found within the limits of British India, and many more in Africa.

No. 236. HERPESTES PALLIDUS *vel* GRISEUS.

The Common Grey Mungoose (*Jerdon's Nos.* 127 *and* 128).

NATIVE NAMES.—*Mungus*, *Newul*, *Newra*, *Nyul*, Hindi; *Mungli*, Canarese; *Yentawa*, Telegu; *Koral*, Gondi; *Moogatea*, Singhalese.

HABITAT.—India generally and Ceylon, but apparently not in Burmah.

DESCRIPTION.—Light iron grey with a yellowish tint, some more rufous, the hairs being ringed with brown and grey or yellowish-white; muzzle and feet brown; irides light brown.

SIZE.—Head and body, 16 to 20 inches; tail, 14 to 16½ inches.

Jerdon calls this the Madras mungoose, and separates it from the next species, but they are apparently the same. Dr. Anderson prefers the specific name *pallidus* to either *griseus* or *Malaccensis*, as *griseus* originally included an African species, and the latter name is geographically misleading. Hodgson's name *H. nyula* is objectionable, as *nyul* or *newul* is applied by natives to all mungooses generally. Jerdon's Nos. 127 and 128 differ only in colour and size; according to him the lighter and larger, *griseus*, being the Southern India mungoose, and the browner and smaller, *Malaccensis*, the Bengal and the Northern India one. But at Sasseram in Behar, I some years ago obtained a very large specimen of the lighter species, and have lately seen a skin from the North-west Provinces. This animal is familiar to most English residents in the Mofussil; it is, if unmolested, fearless of man, and will, even in its wild state, enter the verandahs and rooms of houses. In one house I know a pair of old ones would not only boldly lift the bamboo chicks and walk in, but in time were accompanied by a young family. When domesticated they are capable of showing as much attachment as a dog. One that I had constantly with me for three years died of grief during a temporary separation, having refused food from the time I left. I got it whilst on active service during the Indian Mutiny, when it was a wee thing,

smaller than a rat. It travelled with me on horseback in an empty holster, or in a pocket, or up my sleeve; and afterwards, when my duties as a settlement officer took me out into camp, "Pips" was my constant companion. He knew perfectly well when I was going to shoot a bird for him. He would stand up on his hind legs when he saw me present the gun, and rush for the bird when it fell; he had, however, no notion of retrieving, but would scamper off with his prey to devour it at leisure. He was a most fearless little fellow, and once attacked a big greyhound, who beat a retreat. In a rage his body would swell to nearly twice its size from the erection of the hair, yet I had him under such perfect subjection that I had only to hold up my finger to him when he was about to attack anything, and he would desist. I heard a great noise one day outside my room and found Master "Pips," attacking a fine male specimen I had of the great bustard, *Eupodotis Edwardsii*, and had just seized it by the throat. I rescued the bird, but it died of its injuries. Through the carelessness of one of my servants he was lost one day in a heavy brushwood jungle some miles from my camp, and I quite gave up all hopes of recovering my pet. Next day, however, in tracking some antelope, we happened to cross the route taken by my servants, when we heard a familiar little yelp, and down from a tree we were under rushed "Pips." He went to England with me after that, and was the delight of all the sailors on board, for his accomplishments were varied; he could sit on a chair with a cap on his head, shoulder arms; ready, present, fire!—turn somersaults, jump, and do various other little tricks.

From watching him I observed many little habits belonging to these animals. He was excessively clean, and after eating would pick his teeth with his claws in a most absurd manner. I do not know whether a mungoose in a wild state will eat carrion, but he would not touch anything tainted, and, though very fond of freshly-cooked game, would turn up his nose at high partridge or grouse. He was very fond of eggs, and, holding them in his fore-paws, would crack a little hole at the small end, out of which he would suck the contents. He was a very good ratter, and also killed many snakes against which I pitted him. His way seemed to be to tease the snake into darting at him, when, with inconceivable rapidity, he would pounce on the reptile's head. He seemed to know instinctively which were the poisonous ones, and acted with corresponding caution. I tried him once with some sea-snakes (*Hydrophis palamoides*), which are poisonous, but he could get no fight out of them, and crunched their heads off one after the other. I do not believe in the mungoose being proof against snake poison, or in the antidote theory. Their extreme agility prevents their being bitten, and the stiff rigid hair, which is excited at such times, and a thick loose skin, are an additional protection. I think it has been proved that if the

poison of a snake is injected into the veins of a mungoose it proves fatal. The female produces from three to four young at a time.

The cry of the mungoose is a grating mew, varied occasionally by a little querulous yelp, which seems to be given in an interrogative sort of way when searching for anything. When angry it growls most audibly for such a small beast, and this is generally accompanied by a bristling of the hair, especially of the tail.

No. 237. HERPESTES JERDONI *vel* MONTICOLUS.

The Long-tailed Mungoose (*Jerdon's No.* 129).

HABITAT.—Indian peninsula, it having been found in the extreme south as well as Kashmir in the north and Singbhoom in the centre.

DESCRIPTION.—Colour like the last, but more yellow in general tone; tail long, tipped with maroon and black, very hairy; feet dark reddish-brown; muzzle slightly tinged with red; under fur pale yellowish, the long hairs being broadly tipped with brown, darkest at the tip, paler at the base, then a white band; then three brown bands separated by white, the base of the hair being broadly white; the skull is distinguishable by the breadth of the frontal region across the post-orbital processes, and between the anterior margins of the orbit. Dr. Anderson considers this as identical with the Kashmir *H. thysanurus*, which has also been found by Mr. Ball in Singbhoom. Dr. Gray says it is very like the African *H. ichneumon*, only paler. Dr. Jerdon had only obtained it from the Eastern Ghâts inland from Nellore, where it inhabits forests among the hills.

SIZE.—Head and body, 20 inches; tail, 19 inches.

No. 238. HERPESTES SMITHII.

The Ruddy Mungoose (*Jerdon's No.* 130).

NATIVE NAME.—*Deeto*, Singhalese.

HABITAT.—Southern India and Ceylon.

DESCRIPTION.—Reddish ferruginous brown, long hair, well grizzled, more red on the head and outer part of limbs; hairs annulated dark and white, with reddish tips; muzzle long and flesh-coloured; feet black; tip of tail black.

SIZE.—Head and body, 15 inches; tail, 12 to 13 inches.

This is the same as *H. Ellioti* of Blyth, and *H. rubiginosus* of Kellaart, and *Calictis Smithii* of Gray.

No. 239. HERPESTES AUROPUNCTATUS.

The Gold-speckled Mungoose (*Jerdon's No.* 131).

HABITAT.—The plains near the hills from Afghanistan to Bengal, also Assam and Burmah, and on into the Malayan peninsula.

DESCRIPTION.—General colour olive brown with a golden hue, or finely speckled with golden yellow, due to the fine annulation of the hair; the sides of the body slightly paler, and not so yellow; under parts dirty yellowish-white; limbs the same colour as the body; the under fur is purplish-brown in its lower two-thirds, and pale yellow in its terminal third; the long hair is smooth, fine, short, and adpressed; the tips are dark brown, then yellow, then brown, twice repeated; occasionally a yellow band at the base; in the tail there are generally eight bands, with the terminal dark brown; the skull is remarkable for the narrow and elongated character of its facial portion; the orbit is perfect in the adult. Length of skull about 1 1/2 inches; width at the zygoma, 1/4.

SIZE.—Head and body, 12 to 13 inches; tail, 9 to 10 inches.

This and *H. persicus* are the smallest of the genus; it is included in Gray's genus *Calogale*, and he gives the specific name followed by Jerdon, *Nipalensis*, which is geographically misleading. I have therefore followed Dr. Anderson in retaining the more appropriate title. *H. persicus* is closely allied, but the nasal portion of the palate is narrower.

No. 240. HERPESTES FUSCUS.

The Nilgherry Brown Mungoose (Jerdon's No. 132).

HABITAT.—Madras Presidency, Neilgherries.

DESCRIPTION.—General colour, brown; hair ringed black and yellow, tawny at the base; throat dusky yellowish.—*Jerdon.*

SIZE.—Head and body, 18 inches; tail, with hair, 17 inches.

241. HERPESTES (ONYCHOGALE *of Gray*) MACCARTHIÆ.

HABITAT.—Ceylon.

DESCRIPTION.—Reddish-brown; elongate, flaccid, pale brown, with a broad thick sub-terminal band and a long whitish-brown tip; fur of hands and face shorter; feet blackish brown; hair white-tipped; tail redder; hair elongate, one coloured red; ears rounded, hairy.—*Gray.*

No. 242. HERPESTES FERRUGINEUS.

HABITAT.—Sind.

DESCRIPTION.—Resembles rufous specimens of *H. pallidus*, but the skull shows differences in the greater breadth of the post-orbital contraction of the frontals, and a shorter, broader muzzle, more particularly with posterior or nasal part of the palate.

The next species, which is included in Gray's genus *Tæniogale*, has the bony orbit always perfect, and the molars are $\frac{6-6}{7-7}$.

No. 243. HERPESTES VITTICOLLIS.

The Stripe-necked Mungoose (*Jerdon's No.* 133).

NATIVE NAME.—*Loco-moogatea*, Singhalese.

HABITAT.—Southern India, Ceylon, Burmah?

DESCRIPTION.—Grizzled grey, more or less ferruginous, especially on the rump and tail; a dark stripe from the ear to the shoulder; tail rufous black at the tip; skull characteristics: large, with flattened and expanded frontal region, projected narrow muzzle and powerful teeth, larger than other Asiatic *Herpestes*, the last molar being proportionately greater.

SIZE.—Head and body 21 inches; tail 15 inches.

I have put Burmah in the list of places where this mungoose is found, having lately been shown by Mr. Davison the skin of a stripe-necked mungoose obtained by him in Burmah, which seemed to be of this species.

The next has been formed into a separate genus, *Urva;* the teeth are blunter than in *Herpestes*.

No. 244. URVA CANCRIVORA.

The Crab-eating Mungoose (*Jerdon's No.* 134).

HABITAT.—South-east Himalayas, Assam, and Burmah.

DESCRIPTION.—"General colour fulvous iron-grey, inner fur woolly, outer of long straggling lax hairs, generally ringed with black, white,

Urva cancrivora.

and fulvous; in some the coat has a variegated aspect; in other as uniform tawny tint prevails, and in a few dark rusty brown mixed with grey is the prevalent hue; abdomen brown; limbs blackish-brown; a

white stripe on either side of the neck from the ear to the shoulder; tail rufous or brown, with the terminal half rufous" (*Jerdon*). Gray's account is: "black grizzled hairs with a very broad white sub-terminal ring; a white streak on the side of the neck; legs and feet black; tail ashy red at the end."

SIZE.—Head and body, 18 inches; tail, 11 inches.

Somewhat aquatic in its habits, living on frogs and crabs. It has two anal glands, from which it can squirt a fœtid secretion. It is the only mungoose mentioned in Blyth's 'Catalogue of the Mammals of Burmah,' but there are at least two more, and probably some of the Malayan species are yet to be found in Tenasserim.

CYNOIDEA.

This is the next and last section in the order I have adopted, of the land Carnivora, and contains the typical family *Canis*. All the animals that we shall have to deal with might and would be by some authors brought into this one genus, the only others recognised by them being the two African genera, *Megalotis* and *Lycaon*, the long-eared fox and the hyæna-dog, and the *Nyctereutes* or racoon-dog of Northern China and Amoorland. But although all our Indian species might be treated of under the one genus *Canis*, it will be better to keep to the separation adopted by Jerdon, and classify the wolves and jackals under *Canis*, and the foxes under *Vulpes*. As regards the wild dog of India, its dentition might warrant its being placed in a separate genus, but after all the name chosen for it is but merely a difference in sound, the two being the same thing in Latin and Greek.

But although this group contains the smallest number of forms, the varieties of the domestic dog are endless, and no part of the world is without a species of the genus, except certain islands, such as the West Indies, Madagascar, the Polynesian isles, New Zealand and the Malayan archipelago; in these territories there is no indigenous dog. I speak of dogs in its broad sense of *Canis*, including wolves and foxes.

The proper position of the *Cynoidea* should be between the bears and the cats, as in their dentition they approximate to the former, and in their digitigrade character to the latter; but, with a view to make this work concurrent with that of Jerdon's, I have accepted the position assigned by him, though it be a little out of place.

The general form of the skeleton of a dog resembles that of a feline, though the limbs may be to a certain extent longer; they also walk on the tips of their toes, but their claws are not retractile, although the

ligament by which the process of retraction in the cat is effected is present in a rudimentary form, but is permanently overpowered by the greater flexor muscles. A dog's paw is therefore by no means such a wonderful piece of mechanism and example of power as that of the cat, but is feeble in comparison, and is never used as a weapon of offence, as in the case of felines, the prey being always seized by the teeth.

The skull partakes of the characteristics of both cat and bear. It departs from the simple cutting dentition of the former by the addition of two tuberculated molars in each upper jaw, or one more than the rudimentary molar in the cat, whilst the lower jaw has two extra molars on each side; the premolars are also in excess, being four in number on each side of the upper and lower jaws, whereas in the feline there are three above and two below.

There is also a difference in the lower carnassial or first molar, which impinges on the upper carnassial or fourth premolar; it has a protuberance behind, termed the heel, which is prominently marked, but it is in the molars in which the greatest deviation from the specially carnivorous dentition occurs. The incisors are somewhat larger than, but the canines and premolars approximate to, those of the felines; the crown of the incisors is cuspidate, and the premolars increase gradually in size, with the exception of the fourth in the upper jaw, the carnassial, which is treble the size of the one next to it.

But it is in the molars that we find the similarity to the semi-herbivorous bears. The last two molars on each side of the upper and lower jaws are true grinders, divided into four cusps, which suits the dog to a mixed diet.

Of course the increased number of teeth (the dog has forty-two against thirty of the cat) necessitates a prolonged muzzle, and therefore the skull has more of the bear than the cat shape. The nasal bones are long, the zygomatic arch smaller, but it has the ear-bulb or *bulla tympani*, so conspicuous in the cat and wanting in the bear, yet the character of the aperture of the ear or *auditory meatus* approaches that of the latter, as the margins of its outer aperture are somewhat prolonged into a short tube or spout, instead of being flush, as in the felines. Then the bony clamp or par-occipital process, which in the cats is fixed against the hinder end of the bulla, is in the dogs separated by a decided groove.

The intestinal peculiarities of this section consist of a very large *cæcum* or blind gut, which is small in the cats and wholly absent in the bears, and in the very long intestines. Some have a sub-caudal gland secreting a pungent whey-like matter.

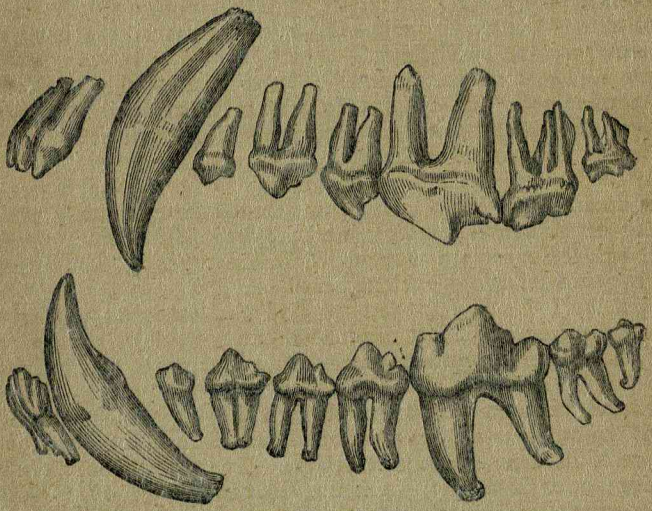
GENUS CANIS—THE DOG.

Muzzle obtuse; tail short; no caudal gland.

Dental formula: inc., $\frac{6}{6}$; can., $\frac{1-1}{1-1}$; premolar, $\frac{4-4}{4-4}$; molar, $\frac{2-2}{3-3}$.

This genus contains the wolf and the jackal, as well as the dog proper.

The origin of the domestic dog (*Canis familiaris*) is involved in obscurity; it is mentioned in its domestic state and in an infinity of



Dentition of Wolf.

varieties in records of remote ages. Job talks of "the dogs of my flock," and in the Assyrian monuments, as far back as 3400 years before Christ, various forms are represented; and in Egypt not only representations of known varieties, easy to be recognised, are found, but numerous mummies have been exhumed, the animal having been held in special veneration. There is a preponderance of opinion strongly in favour of the theory that the domestic dog sprang from the wolf, and much argument has been advanced in support of this idea. The principal objection made to this by those who hold opposite views is the fact that no dog in a wild state barks, but only howls.

Now for the evidence adduced in support of the former assertion, some domesticated species of dog closely resembling the wild wolf.

Sir John Richardson says of the Eskimo dog that it is not only extremely like the North American wolf (*Canis lupus*), both in form, colour, and nearly in size, but that the howl of both animals "is prolonged so exactly in the same key that even the practised ear of an Indian fails at times to discriminate them." He adds of the dog of the Hare Indians, a distinct breed, that it is almost the same as the prairie wolf (*Canis latrans*), the skull of the dog appeared to him a little smaller, otherwise he could detect no difference in form, nor fineness of fur, nor the arrangement of spots of colour.

Professor Kitchen Parker writes: "Another observer remarks that, except in the matter of barking, there is no difference whatever between the black wolf-dog of the Indians of Florida and the wolves of the same country. The dogs also breed readily with the wild animals they so closely resemble. The Indians often cross their dogs with wolves to improve the breed, and in South America the same process is resorted to between the domesticated and the wild dogs." He then goes on to allude to many varieties of dogs closely resembling wolves—the shepherd dog of Hungary, which is so like that a Hungarian has been known to mistake a wolf for one of his own dogs. Some Indian pariahs, and some dogs of Egypt, both now and in the condition of mummies, closely resemble the wolf of their country. The domestic dogs of Nubia and certain mummified forms are closely related to jackals. The Bosjesman's dog is very like the black-backed jackal (*Canis mesomelas*). Domestic dogs which have run wild do in some measure, though not entirely, revert to the wolf type. The dingo of Australia is thought to be derived from some imported variety of dog. The wolf is easily tamed, and even in its wild state has some of the peculiarities of the dog; for instance, a young wolf, when surprised and threatened by the hunter, will crouch and fawn like a spaniel. Mr. Bell tells of a she-wolf in the Regent's Park Zoological Gardens which would bring her cubs to the bars of the cage, that they might be caressed by the visitors; and there is a most interesting account, too long for insertion here, in the third volume of the old *India Sporting Review* (new series) chiefly taken from Major Lloyd's 'Scandinavian Adventures,' of the tameability of wolves, giving an instance of two cubs out of a litter of three becoming as faithfully attached as any dog. The period of gestation (sixty-three days) is the same in both animals, and they will interbreed freely, the progeny being also fertile. There only now remains the question of the bark, which, singularly enough, is peculiar to the domesticated dog only, and may have arisen in imitation of the gruffer tones of the human voice. The domestic dog run wild will in a few generations lose the power of barking. This happened on the island of Juan Fernandez; the dogs

there quite lost their bark in thirty-three years, and it is said that a few caught and removed after that period reacquired it very slowly. We may then, I think, accept Darwin's opinion that "it is highly probable that the domestic dogs of the world have descended from two good species of wolf (*C. lupus* and *C. latrans*), and from two or three other doubtful species of wolves (namely, the European, Indian, and North African forms), from at least one or two South American canine species, and from several races or species of the jackal."

No. 245. CANIS PALLIPES.

The Indian Wolf (*Jerdon's No.* 135).

NATIVE NAMES.—*Bheria*, *Bhera*, North and Central India; *Landagh*, South India; *Nekra*, in some parts; *Bighana*, *Hunder*, or *Hurar*, in Bundelcund; *Tola*, Canarese; *Toralu*, Telegu.

HABITAT.—Throughout the whole of India, though Hodgson says he has not found it in the Himalayas, nor can I find any notice of it in Burmah, and it is likewise absent in Ceylon.

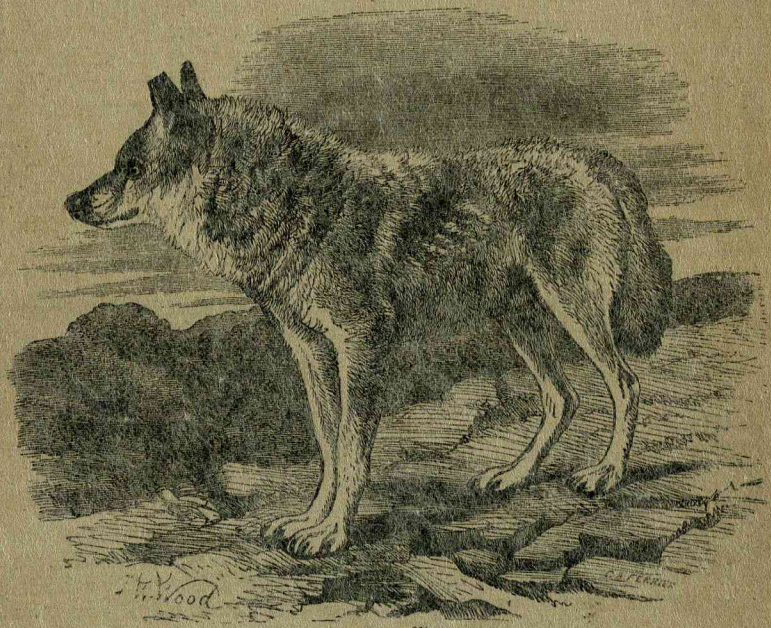
DESCRIPTION.—"Hoary fulvous or dirty reddish-white, some of the hairs tipped with black, which gives it a grizzled appearance; somewhat reddish on the face and limbs, the latter paler than the body; lower parts dingy white; tail thinly bushy, slightly black-tipped; ears rather small" (*Jerdon*). But, as a matter of fact, wolves vary greatly in colour. Every one who has seen much of them will bear testimony to this. Sir Walter Elliot says: "Several adults that I shot differed in their colours and general character." The late Brigadier-General McMaster, in his notes on Jerdon, wrote: "Wolves vary a good deal in colour and length of hair, probably with season and climate. I have seen some of light reddish-grey, and others much darker than any jackal;" and he speaks of another "nearly as red as an Irish setter."

SIZE.—Head and body, about 3 feet; tail, 16 to 18 inches; height at shoulder, 26 inches.

The Indian wolf is somewhat inferior in size to the European one, and is probably less ferocious, or at all events its ferocity is not called out by the severity of the climate, as in the case of *C. lupus*. We never hear of them attacking bodies of men and overwhelming them by numbers. In 1812 twenty-four French soldiers were surrounded by an immense troop of wolves; and though, it is said, the men killed two or three hundred of their assailants, they had to succumb at last to numbers, and were all devoured. This was doubtless an extreme case, but in the severe winters of the north, when these animals band together and roam abroad in search of food, they will attack anything that comes in their way, although a single wolf will hardly ever dare to meddle with a man.

In India one seldom hears of their attacking grown-up men. I remember an instance in which an old woman was a victim; but hundreds of children are carried off annually, especially in Central India and the North-west provinces.

Stories have been related of wolves sparing and suckling young infants so carried off, which, if properly authenticated, will bring the history of Romulus and Remus within the bounds of probability. I have not by me just now the details of the case of the "Boy-Wolf" of Lucknow,



Canis pallipes.

which was, I believe, a case vouched for by credible witnesses. It was that of a boy found in a wolf's lair, who had no power of speech, crawled about on his hands and knees, ate raw flesh, and who showed great wildness in captivity. I think he died soon after being caught. The story of the nursing is not improbable, for well-known instances have been recorded of the *feræ*, when deprived of their young, adopting young animals, even of those on whom they usually prey. Cats have been known to suckle young leverets. The wolf in its wild state is par-

cularly partial to dog as an article of diet, yet in confinement it will attach itself to its domesticated canine companions, and interbreed with them. A writer in the *India Sporting Review*, vol. vi. of 1847, page 252, quoted by McMaster, says he received from Dr. Jameson, Superintendent of the Botanical Gardens at Saharunpore, a hybrid, the produce of a tame female wolf and a pointer dog. This hybrid died when twenty months old, and is said to have been mild and gentle; its howl seems to have had more of the bark in it than the cry of the hybrid jackal, and to have been more dog-like. "It exactly resembled the coarse black pariah to be seen about Loodhiana and Ferozepore," the black colour doubtless coming from the pointer sire. As General McMaster remarks, it would be interesting to know what the colours of the rest of the litter were. Wolves do, I think, get light-coloured with great age. I remember once having one brought into my camp for the usual reward by a couple of small boys, the elder not more than ten or twelve years of age, I should think. The beast was old and emaciated, and very light coloured, and, doubtless impelled by hunger, attacked the children, as they were herding cattle, with a view to dining off them; but the elder boy had a small axe, such as is commonly carried by the Gonds, and, manfully standing his ground, split the wolf's skull with a blow—a feat of which he was justly proud.

Sir Walter Elliot's description of the manner in which wolves hunt has been quoted by Jerdon and others, but, as it is interesting, I reproduce it here:—

"The wolves of the southern Mahratta country generally hunt in packs, and I have seen them in full chase after the goat antelope *Gazella Arabica* (*Bennettii*?). They likewise steal round the herd of *Antilope cervicapra* and conceal themselves on different sides till an opportunity offers of seizing one of them unawares as they approach, while grazing, to one or other of their hidden assailants. On one occasion three wolves were seen to chase a herd of gazelle across a ravine in which two others were lying in wait. They succeeded in seizing a female gazelle, which was taken from them. They have frequently been seen to course, and run down hares and foxes; and it is a common belief of the ryots that in the open plains, where there is no cover or concealment, they scrape a hole in the earth, in which one of the pack lies down and remains hid, while the others drive the herd of antelope over him. Their chief prey, however, is sheep; and the shepherds say that part of the pack attack, and keep the dogs in play, while others carry off their prey, and that, if pursued, they follow the same plan, part turning and checking the dogs, while the rest drag away the carcase, till they evade pursuit. Instances are not uncommon of their attacking man. In 1824 upwards of thirty children were devoured by wolves in one pergunnah alone. Sometimes a large wolf is seen

seek his prey singly; these are called *Won-tola*, and are reckoned particularly fierce."

McMaster corroborates the account of wolves hiding themselves by scratching holes in the ground whilst antelope were quietly walking up to the ambush; and there is a most amusing account given by Major Lloyd, in his 'Scandinavian Adventures,' of the wiles of a tame wolf in her efforts to get young pigs within her reach. He says: "When she saw a pig in the vicinity of her kennel, she evidently, with the purpose of putting him off his guard, would throw herself on her side or back, wag her tail most lovingly, and look innocence personified; and this amicable demeanour would continue until the grunter was beguiled within reach of her tether, when, in the twinkling of an eye, 'Richard was himself again!'" Major Lloyd asserts that but for this *penchant* for his neighbours' pigs he would have trained this wolf as a pointer.

Jerdon states that he has known wolves turn on dogs that were running at their heels, and pursue them smartly till close up to his horse. He adds: "A wolf once joined with my greyhounds in pursuit of a fox, which was luckily killed almost immediately afterwards, or the wolf might have seized one of the dogs instead of the fox. He sat down on his haunches, about sixty yards off, whilst the dogs were worrying the fox, looking on with great apparent interest, and was with difficulty driven away."

No. 246. CANIS LANIGER (LUPUS CHANCO *of Gray*).

The Thibetan Wolf.

NATIVE NAMES.—*Chanko, Changu.*

HABITAT.—Thibet.

DESCRIPTION.—Yellowish-grey, with long soft hairs (*Kinloch*). Long sharp face, elevated brows, broad head, large pointed ears, thick woolly pelage, and very full brush of medial length; above dull earth-brown; below, with the entire face and limbs, yellowish-white; no marks on limbs; tail concolourous with the body, that is brown above and yellowish below, and no dark tip (*Hodgson*).

SIZE.—Length, 4 feet; tail, 20 inches; height, 30 inches.

Hodgson says this animal is common all over Thibet, and is a terrible depredator among the flocks, or, as Kinloch writes: "apparently preferring the slaughter of tame animals to the harder task of circumventing wild ones." The great Bhotea mastiff is chiefly employed to guard against it. According to Hodgson the chanko has a long, sharp face, with the muzzle or nude space round the nostrils produced considerably beyond the teeth, and furnished with an unusually large lateral process, by which the nostrils are much overshadowed sideways and nearly closed. The eye is small and placed nearer to the ear than

the nose; the brows are considerably elevated by the large size of the frontal sinuses; the ears are large and gradually tapered to a point from their broad bases, and they have the ordinary fissure towards their posteal base; the head is broad; the teeth large and strong; the body long and lank, the limbs elevated and very powerful; the brush extends to half-way between the mid-flexure (*os calcis*) of the hind limbs and their pads, and is as full as that of a fox.

The fur or pelage is remarkable for its extreme woolliness, the hairy piles being few and sparely scattered amongst the woolliness, which is most abundant; the head as far as the ears, the ears, and the limbs are clad in close ordinary hair; the belly is thinly covered with longer hairs; but all the rest of the animal is clothed in a thick sheep-like coat, which is most abundant on the neck above and below. Gray ('P. Z. S.,' 1863, p. 94) says: "The skull is very much like, and has the same teeth as the European wolf (*C. lupus*)," but in this I think he is mistaken, as the upper carnassial in *C. lupus* is much larger than in any of the Asiatic wolves, and in this particular *C. laniger* is affined to *C. pallipes*. There is a black variety of the chanko, as there is of the European wolf, and by some he is considered a distinct species, but is really a melanoid variety, though Kinloch writes: "The black chanko is rather larger than the grey one; he is of a beautiful glossy black, with a small white star on the chest and a few grey hairs about the muzzle." He was fortunate enough to secure two cubs of this variety. "They fed ravenously on raw meat, and before long became pretty tame." After accompanying him for two months he left them at the hill station of Kussowlie, fearing that the heat at Meerut might prove too great for them; at the end of 2½ months they were sent down. "By this time they had immensely increased in size, but, although they had not seen me for so long, they recognised me, and also my greyhound, of which they had previously been very fond. They soon became much attached to me, and would fawn on me like dogs, licking my face and hands; they were always, however, ready to growl and snap at a stranger. I took them to Agra at the time of the great Durbar there, and used to let them loose in camp with my dogs, so tame had they become."

He eventually presented them to the Zoological Gardens in Regent's Park, and their portraits appeared in the *Illustrated London News* of November 21st, 1868. Whether the skins purchased at Kashgar by the Yarkand Mission were of *C. laniger* or *lupus* is doubtful, as no skulls were procured. In some particulars they seem to agree with the chanko in being rather larger (i.e., larger than *pallipes*); the hair long, and the under fur ash-grey and *woolly*, but the black line down the fore-legs is like *C. lupus*. It is not stated whether the tail was dark-tipped or not, the absence of this dark tip, common to most other wolves, is a point noticed by Hodgson in speaking of *C. laniger*. Mr. Blanford

describes another skin which was purchased at Kashgar, and which he supposes may belong to a new species, but there was no skull with it—it is that of a smaller canine, midway between a wolf and a jackal, the prevailing tint being black, mixed with pale rufous, and white along the back and upper surface of the tail; pale rufous on the flanks, limbs, anterior portion of the abdomen and under the tail; a distinct black line down the front of each foreleg; upper part of head rufous, mixed with whitish and black, the forehead being greyer, owing to the white tips to the hairs; the tip of the tail is quite black, and the tail itself is short, as in the jackal, but more bushy, the feet larger than the common jackal—a short, bushy tail agrees with *Cuon*, so also does the large foot.

No. 247. CANIS LUPUS.

The European Wolf.

HABITAT.—All over Europe and Northern Asia, in Turkestan and Yarkand (?)

DESCRIPTION.—Fur long and coarse, dark yellowish-grey, sometimes almost black, but there is a good deal of variation in both colour and texture of the hair according to the country, whether cold or warm, from which the animal comes; a dark streak on the forelegs; the carnassial tooth is however the chief point of distinction between this and the Indian and Thibetan species; it is very much larger in the European animal, approximating to, and sometimes exceeding in size, the two molars together, which is not the case with the others. Mr. Blanford, in his report on the Mammalia of Yarkand published by Government in the 'Scientific Results of the Second Yarkand Mission,' quotes from Professor Jeitteles, of Vienna, the opinion that none of the larger domestic dogs could have descended from the European wolf, because of the relative proportions of their teeth, but that all must have been derived from the Indian wolf or from allied forms.

SIZE.—Head and body, 3½ to 4 feet; tail, 20 inches; height, about 30 to 32 inches.

Mr. Blanford supposes, and with some degree of reason, that the flat skins purchased at Kashgar were those of this species; but unfortunately the absence of the skulls must for the present leave this in doubt, as variations in colour and texture of fur are frequent and dependent on climatic conditions.

No. 248. CANIS AUREUS.

The Jackal (Jerdon's No. 136).

NATIVE NAMES.—*Srigala*, Sanscrit; *Geedhur*, Hindi; *Shial*, *Sial*, *Siar* and *Shialu*, Bengali; *Kola*, Mahrathi; *Nari*, Canarese; *Nakka*, Telegu;

...rka, Gondi; *Shingal* or *Sjekal*, Persia; *Amu*, Bhotia; *Myae-khaiwa*, Burmese; *Nareeah*, Singhalese.

HABITAT.—Throughout India, Burmah, and Ceylon; it is found over a great part of Asia, Southern Europe, and Northern Africa.

DESCRIPTION.—"Fur dusky yellowish or rufous grey, the hairs being mottled black, grey, and brown, with the under fur brownish yellow; lower parts yellowish-grey; the tail reddish-brown, ending in a darkish tuft; more or less rufous on the muzzle and limbs; tail moderately hairy."—*Jerdon.*

SIZE.—Head and body, 28 to 30 inches; tail, 10 or 11 inches; height, 16 to 18 inches.

The jackal is one of our best-known animals, both as a prowler and scavenger, in which capacity he is useful, and as a disturber of our midnight rest by his diabolical yells, in which peculiarity he is to be looked upon as an unmitigated nuisance.

He is mischievous too occasionally, and will commit havoc amongst poultry and young kids and lambs, but, as a general rule, he is a harmless, timid creature, and when animal food fails he will take readily to vegetables. Indian corn seems to be one of the things chiefly affected by him; the fruit of the wild behr-tree (*Zizyphus jujuba*) is another, as I have personally witnessed. In Ceylon he is said to devour large quantities of ripe coffee-berries, the seeds, which pass through entire, are carefully gathered by the coolies, who get an extra fee for the labour, and are found to be the best for germination, as the animal picks the finest fruit. According to Sykes he devastates the vineyards in the west of India, and is said to be partial to sugar-cane. The jackal is credited with digging corpses out of the shallow graves, and devouring bodies. I once came across the body of a child in the vicinity of a jungle village which had been unearthed by one. At Seonee we had, at one time, a plague of mad jackals, which did much damage. Sir Emerson Tennent writes of a curious horn or excrescence which grows on the head of the jackal occasionally, which is regarded by the Singhalese as a potent charm, by the instrumentality of which every wish can be realised, and stolen property will return of its own accord! This horn, which is called *Nari-comboo*, is said to grow only on the head of the leader of the pack.

The domestic dog is supposed to owe its origin to this species, as well as to the wolf, but all conjecture on this point can be but pure speculation. Certain it is that the pariahs about villages are strikingly like jackals, at least in many cases, and they will freely interbreed.

The writer in the *India Sporting Review* alluded to by me in writing of the wolf, mentions some experiments made in crossing dogs with jackals. "First cross, hybrid between a female jackal and Scotch terrier dog, or half jackal and half dog; second cross, between the hybrid

jackal and terrier, or quarter jackal and three-quarters dog; third cross between the quarter jackal and terrier, or seven-eighths dog and one-eighth jackal. Of the five pups comprising the litter, of which the last was one, two were fawn-coloured and very like pariahs, while three had the precise livery of the jackal; noses sharp and pointed; ears large and erect; head and muzzle like the jackal. This cross, he remarks, appears to have gone back a generation, and to have resembled the jackal much more than their mother, whose appearance, with the exception of the very sharp muzzle, although she had so much jackal blood, was that of a sleek, well-fed pariah dog, colour yellow fawn, but her gait and gallop were precisely that of the jackal."—*McMaster*.

GENUS CUON.

Dentition as in restricted *Canis*, but wanting the second grinder behind the flesh-tooth in the lower jaw; the nose is short; skull arched; the forehead broad, convex, and gradually shelving from the nose line; nasals long, produced behind the hinder upper edge of the maxillaries.

No. 249. CANIS (CUON) RUTILANS.

The Indian Wild Dog (*Jerdon's No.* 137).

NATIVE NAMES.—*Jungli-kutta; Son-kutta; Ban-kutta, Ram-kutta*, Hindi; *Kolsun, Kolusna, Kolsa* and *Kolasra*, Mahrathi; *Reza-kutta, Adavi-kutta*, Telegu; *Shen-nai*, Malabarese; *Eram-naiko*, Gondi; *Sakki-sarai*, at Hyderabad; *Ram-hun* in Kashmir; *Siddaki*, Thibetan, in Ladakh; *Suhu-tum*, Lepcha; *Paoho*, Bhotea; *Bhaosa, Bhoonsa, Buansu* in the Himalayas, generally from Simla to Nepal (*Jerdon*); *Tao-khwae*, Burmese; *Assoo-adjakh, Assoo-kikkee*, Javanese; *Oesoeng-esang*, Sundese; *An-jing Utan*, Malay; *Hazzee*, Thibetan.

HABITAT.—The whole of India and down the Burmese country to the Malayan archipelago, but not in Ceylon, although Jerdon asserts that it is common there. I however cannot find any authority for this, and both Kellaart and Sir Emerson Tennent affirm that there are no wild dogs in Ceylon.

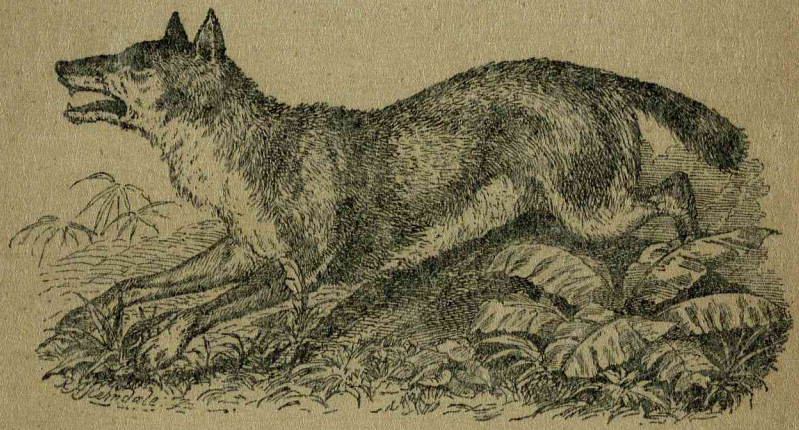
DESCRIPTION.—General colour bright rusty or red, somewhat paler beneath; ears large and erect, round at the tips; large, hairy-soled feet; very bushy, straight tail, reaching half-way from the hough to the sole, with a dark tip. It stands lower in front than behind; and, though somewhat resembling a jackal, has an unmistakable canine physiognomy; the eye is fuller and better placed, and forehead broader, and the muzzle less pointed.

SIZE.—Head and body, 32 to 36 inches; tail, 16 inches; height 17 to 20 inches.

It has been supposed that there were two or three species of wild dog to be found within the limits of British India, but it is now, I think, conclusively settled that the Malayan and Indian species are one, and that those from Darjeeling and other hills, which showed variation, are the same, with slight differences caused by climate. They are certainly not canine in disposition; the wolf and jackal are much more so, for in confinement they are as ill-conditioned brutes as it is possible to conceive. Those in the Regent's Park Gardens are active, snappy' snarly, wild-looking creatures. Hodgson writes of them: "Those I kept in confinement, when their den was approached, rushed into the remotest corner of it; huddled one upon another, with their heads concealed as much as possible. I never dared to lay hands on them, but if poked with a stick they would retreat from it as long as they could, and then crush themselves into a corner, growling low, and sometimes, but rarely, seizing the stick and biting it with vehemence. After ten months' confinement they were as wild and shy as the first hour I got them. Their eyes emitted a strong light in the dark, and their bodies had the peculiar fœtid odour of the fox and jackal in all its rankness." McMaster sent one to the People's Park, at Madras, which he obtained in Burmah, and says of her: "'Evangeline,' as she is named, is certainly though an interesting and rare creature to have in a museum or wild-beast show, the most snarling, ill-mannered, and detestable beast I have ever owned." "Hawkeye," whose most interesting paper on the wild dog appeared in the *South of India Observer*, of January 7th, 1869, alludes to "Evangeline" in the following terms:—"I saw the beast at the People's Park, and a more untameable wretch I never met with; and why so fair a name for such a savage de'il, I know not." It is strange that the most dog-like of the wild canines should refuse domestication when even the savage European wolf has become so attached as to pine during the absence of his master. Jesse, in his 'History of the British Dog,' relates that a lady near Geneva had a tame wolf, which was so attached that when, on one occasion, she left home for a while he refused food and pined. On her return, when he heard her voice, he flew to meet her in an ecstasy of delight; springing up, he placed a paw on each of her shoulders, and the next moment fell backwards and expired. The wild dog, however, refuses all endearments, and keeps his savage nature to the last. I have never heard of their attacking men, but few four-footed beasts, even of large size, escape them. Fortunately they are not as common as jackals, otherwise little game would be left in the country. During my residence in the Seonee district from 1857 to 1864, I only came across them two or three times. Their mode of hunting has been described by various writers—Hodgson, Elliot, Jerdon, and others of less reliability—but one of the best descriptions, which I regret I have not space for *in extenso*, is that to which I have already

luded as written by "Hawkeye," and which may be found in the paper above mentioned, and also in McMaster's notes on Jerdon; but I give a few extracts:—

"Generally speaking, however, the wild dog has not been known to be the aggressor against mankind; and, though not displaying much dread of man, has hitherto refrained from actual attack, for I have never heard of any case proving it otherwise; at the same time it is well known and an established fact that the tiger and leopard are often driven away by these dogs. It is uncertain whether they really attack with intent to kill either the one or the other, but that they have been repeatedly seen following both there is no question. The wild dog in appearance bears much similitude to the English fox; he is however larger, and stands some inches higher, and has no white tip to his tail, which, with his



Cuon rutilans.

muzzle, is perfectly black. The muscular development all over the body is extraordinary. One that I shot, when skinned, was a most perfect specimen of thews and sinews I ever beheld." He describes various hunts by packs of these dogs, in one of which, witnessed by a brother sportsman, the dogs, five in number, in pressing a Sambar stag, spread themselves out like a fan, which he considers a matter of instinct, so that in case of a flank movement the outer dogs would have a chance; in this case however the stag kept straight on, and, the ground being precipitous, he managed to escape. The evidence produced tends to confirm the opinion that the wild dog endeavours to seize the quarry by the flanks and tear out the entrails. According to Hodgson the *buansu*, as it is called in Nepal, runs in a long, lobbing canter, unapt at the

dorable, and considers it inferior in speed to the jackal and fox. It hunts chiefly by day. Six or eight, or more, unite to hunt down their victim, maintaining the chase more by power of smell than by the eye, and usually overcome by force and perseverance, though occasionally mixing stratagem with direct violence. He asserts that in hunting they bark like hounds, but their barking is in such a voice as no language can express. "Hawkeye," however, states that the wild dog does not throw his tongue when in chase; he has heard them make a kind of tremulous whimper.

The stories of their attacking and killing tigers must be received with caution, though it is certain they will harass both tigers and leopards. I wrote some time back, in 'Seonee': "The natives in all parts of India declare that even tigers are attacked by them; and we once heard a very circumstantial account given of a fight, which took place near the station of Seonee, between a tiger and a pack of these dogs, in which the latter were victors. They followed him about cautiously, avoiding too close a contact, and worried him for three successive days—a statement which should be received with caution. We have, however, heard of them annoying a tiger to such an extent as to make him surrender to them the prey which he had killed for himself."

I agree with Jerdon in disbelieving the native superstition that the wild dog sheds a pungent secretion on his tail, and whisks it in the eyes of the animals it attacks, or covers the leaves of the bushes through which the victim graze, and then takes advantage of the temporary blindness thus caused; but it is a curious fact that the idea is prevalent in all parts of India, north and south, and has been accepted by many writers on Indian sports.

The wild dog dwells and breeds in holes and caves in rocks. The breeding season is from January to March, and about six whelps are born at a time. The mammæ are more numerous than in any other canine—from twelve to fourteen. Jerdon notices that Mr. Wilson at Simla discovered a breeding-place in holes under some rocks, where evidently several females were breeding together. At such times they endeavour to hunt their game towards their den, and kill it as near to it as possible.

GENUS VULPES.

The foxes form a distinct group of the Canidæ; their bodies are long, with short legs, the muzzle more lengthened in comparison and much sharper, and the pupil of the eye contracts vertically instead of circularly; the tail is very bushy, with a gland at the base secreting a strong odorous substance. The female has six mammæ. There are two

types in India—the desert fox or fox of the plains, *Cynalopex* of Hamilton Smith; and the hill fox, which approximates to the European species. The former has longer ears and longer and more slender limbs.

No. 250. VULPES BENGALENSIS.

The Indian Fox (Jerdon's No. 138).

NATIVE NAMES.—*Lomri, Lokri, Lokeria,* Hindi; *Kokri,* Mahrathi; *Khekar* and *Khikir* in Behar; *Khek-sial,* Bengali; *Konk, Kemp-nari, Chanaak-nari,* Canarese; *Konka-nakka* or *Gunta-nakka, Poti-nara,* Telegu.—*Jerdon.*

HABITAT.—Throughout India; probably Ceylon, as Kellaart mentions having heard of a fox there, but I cannot trace it, or any other, in Burmah.

DESCRIPTION.—Reddish-grey; rufous on the legs and muzzle; reddish white beneath; ears long dark brown externally; tail long bushy, with a broad black tip; muzzle very acute; chin and throat whitish."—*Jerdon.*

Here is Colonel Sykes's description of it in Southern India:—

"It is a very pretty animal, but smaller than the European fox; head short; muzzle very sharp; eyes oblique; irides nut-brown; legs very slender; tail trailing on the ground, very bushy; along the back and on the forehead fawn colour, with hair having a white ring to its tip; back, neck, between the eyes, along the sides, and half way down the tail reddish-grey; each hair banded black and reddish-white; all the legs reddish outside, reddish-white inside; chin and throat dirty white; along the belly reddish-white; ears externally dark brown, and with the fur so short as to be scarcely discoverable; edges of eyelids black; muzzle red brown."

The colour however varies a good deal, according to season and locality. It becomes more grey in the cold season. McMaster writes that he once killed one silvery grey, almost white.

SIZE.—Head and body, 20 to 21 inches; tail, 12 to 14 inches; weight, 5½ lbs.

This fox is common, not only in open country, but even in cantonments and suburbs of cities. Hardly a night passes without its familiar little chattering bark in the Dalhousie Square gardens, or on the Maidan, being heard; and few passengers running up and down our railway lines, who are on the look-out for birds and animals as the train whirls along, fail to see in the early morning our little grey friend sneaking home with his brush trailing behind him.

Jerdon says of the manner in which he carries this that he trails it when going slowly or hunting for food; holds it out horizontal when running; and raises it almost erect when making a sudden turn.

It also, like the jackal, will eat fruit, such as melons, ber, &c., and herbs. It breeds in the spring, from February to April, and has four cubs. Jerdon says the cubs are seldom to be seen outside their earth till nearly full grown. It is much coursed with greyhounds, and gives most amusing sport, doubling constantly till it gets near an earth; but it has little or no smell, so its scent does not lie.

Sir Walter Elliot wrote of it in the Madras *Journal of Literature and Science* (vol. x. p. 102): "Its principal food is rats, land-crabs, grasshoppers, beetles, &c. On one occasion a half-devoured mango was found in the stomach. It always burrows in open plains, runs with great speed, doubling like a hare; but instead of stretching out at first like that animal, and trusting to its turns as a last resource, the fox turns more at first; and, if it can fatigue the dogs, it then goes straight away."

It is easily tamed if taken young, and is very playful, but Jerdon, in repeating the assertion that tame foxes sooner or later go mad, says he has known one or two instances where they have done so; but McMaster throws doubt on this, and puts the supposed madness down to excitement at the amorous season. He gives an interesting account of a pair kept by a friend, which lived on amicable terms with his greyhounds. The owner writes: "I sometimes took them on to the parade ground, and slipped a couple of greyhounds after them. They never ran far, as when tired they lay down on their backs, and were at once recognised by the dogs. On one occasion one fox was tired before the other, and after he had made friends with the dogs he joined them in the chase after the other."

No. 251. VULPES LEUCOPUS.

The Desert Fox (Jerdon's No. 139).

HABITAT.—Northern India, and also on the Western Coast about Cutch.

DESCRIPTION—"Light fulvous on the face, middle of back and upper part of tail; cheeks, sides of neck and body, inner side, and most of the fore parts of the limbs, white; shoulder and haunch, and outside of the limbs nearly to the middle joint, mixed black and white; tail darker at the base above, largely tipped with white; lower parts nigrescent; ears black posteriorly; fur soft and fine as in *V. montanus*, altogether dissimilar from that of *V. Bengalensis*. The skull with the muzzle distinctly narrower, and the lower jaw weaker. One I killed at Hissar had the upper parts fulvous, the hair black-tipped; sides paler; whole lower parts from the chin, including the inside of the arm and thigh, blackish; feet white on the inner side anteriorly, with a blackish border on the anterior limbs; legs fulvous externally; all feet white; tail always with a white tip."—*Jerdon.*

SIZE.—Head and body, 20 inches; tail, 14 inches; weight, 5½ lbs. According to Mountstuart Elphinstone the backs of the foxes in Hurriana are of the same colour as the common fox, but in one part of the desert their legs and belly, up to a certain height, are black, and in another white—the one seems to have been wading up to the belly in ink, and the other in whitewash.

This fox lives chiefly on the jerboa-rat (*Gerbillus Indicus*) common on sandy plains. Jerdon thinks it more speedy than the common Indian fox.

No. 252. VULPES FERRILATUS.

The Thibetan Grey Fox.

NATIVE NAME.—*Iger*, Thibetan.

HABITAT.—Thibet.

DESCRIPTION.—Pale fulvous, with grizzled white or iron-grey sides; shorter ears than in the Indian fox.

We now come to the true foxes, with shorter legs and moderate ears.

No. 253. VULPES MONTANUS.

The Hill Fox (*Jerdon's No.* 140).

NATIVE NAMES.—*Loh*, Kashmiri; *Lomri*, Hindi, at Simla; *Wamu*, Nepalese.

HABITAT.—Throughout the Himalayas.

DESCRIPTION.—Pale fulvous, with a dark brownish or deep chestnut streak down the back; sides deeper fulvous; the haunches a steely grey, mixed with yellowish hairs; tail grey and very bushy, largely tipped with white; ears deep black on outside; cheeks and jowl greyish-white; moustaches black; legs chestnut in front, paling off behind.

SIZE.—Head and body, 30 inches; tail, 19 inches; weight, 14 lbs.

Not at all unlike an English fox, only more variegated. The foregoing description is taken chiefly from a very fine specimen shot in the garden of the house in which I stayed at Simla; but it is subject to great variation, and is in its chief beauty in its winter dress. Several specimens which I have seen are all more or less different in colour. I have never seen a handsomer fox; the fur is extremely rich, the longer hairs exceeding two inches, and the inner fur is fine and dense. It is said to breed in April and May, the female usually having three to four cubs.

No. 254. VULPES PUSILLUS.

The Punjab Fox (*Jerdon's No.* 141).

HABITAT.—Punjab Salt Range.

DESCRIPTION.—Similar to the last, but much smaller, being about

the size of the Indian fox. Jerdon suggests that it may be a variety of the last species, dwarfed by a warmer climate, but Blyth and others keep it apart.

No. 255. VULPES FLAVESCENS.

The Persian Fox.

NATIVE NAMES.—*Tulke*, at Yarkand; *Wanu*, Nepalese.

HABITAT.—Eastern Turkestan, Ladakh, Persia, and, according to Gray, Indian Salt Range; Thibet.

DESCRIPTION.—Fulvous, darker on back, very similar to *V. montanus*, only more generally rufous and paler, with longer hair and larger teeth; face, outer side of fore-legs and base of tail pale fulvous; spot on side of face, chin, front of fore-legs, and a round spot on upper part of hind foot blackish; hairs of tail tipped black; ears externally black; tail tipped largely with white. The skull of one mentioned by Mr. Blanford had larger auditory bullæ than either the European fox or *V. montanus*.

No. 256. VULPES GRIFFITHII.

The Afghanistan Fox.

This was at first reckoned by Blyth as synonymous with the last, but was afterwards separated and renamed. It is stated by Hutton to be common about Candahar, where the skins are made into *reemchas* and *poshteens*, the price in 1845 being about six annas a skin.

MARINE CARNIVORA.

WE disposed of the land Carnivora in the last article, and now, before proceeding to the Cetacea, I will give a slight sketch of the marine Carnivora, of which, however, no examples are to be found on the Indian coasts. The Pinnipedia or Pinnigrada are amphibious in their habits, living chiefly in the water, but resorting occasionally to the land. There are some examples of the land Carnivora which do the same—the polar bear and otter, and more especially the sea-otter, *Enhydra lutris*, which is almost exclusively aquatic, but these are all decidedly of the quadrupedal type, whereas in the amphibia we see the approach to the fish form necessary for their mode of life. The skeleton reveals the ordinary characteristics of the quadruped with somewhat distorted limbs. The bones of the forelimbs are very powerful and short, a broad scapula, short humerus and the ulna and radius are stout, parallel to each other, and the latter much broader at the base; often in old animals the two are ankylosed at the joint, which is also the case with the tibia and fibula. The hip-bones are narrow and much compressed,

the femur remarkably short, the shank-bones and the bones of the feet very long. In walking on land the feet are, in the case of the *Otaria* or eared seals placed flat on the full sole; the common seals never use their hind limbs on the shore. The dentition is essentially carnivorous, but varies considerably in the different families, and even in the *Phocidæ* themselves. The stomach is simple, but the intestines are considerably longer than in the *Felidæ*, averaging about fifteen times the length of the body; the digestion is rapid. The bones are light and spongy, and the spine particularly flexible, from the amount of cartilage between the bones. They have a large venous cavity in the liver, and the lungs are capacious, the two combining to assist them in keeping under water; the blood is dark and abundant. The brain is large, and in quantity and amount of convolution exceeds that of the land Carnivores. Their hearing is acute, but their sight out of water is defective.

Their external features are an elongated pisciform body, the toes joined by a membrane converting the feet into broad flippers or fins, the two hind ones being so close as to act like the caudal fin of a fish. The head is flattish and elongated, or more or less rounded, but in comparison with the body it is small. Except in the *Otaridæ* there are no perceptible ears, and in them the ear is very small. The fur is of two kinds, one long and coarse, but the other, or under fur, is beautifully soft and close, and is the ordinary sealskin of commerce. The roots of the coarse hair go deeper into the skin than those of the under fur, so the furrier takes advantage of this by thinning the skin down to the coarse roots, cutting them free, and then the hairs are easily removed, leaving the soft fur attached to the skin.

The Pinnigrada are divided into three families—the *Trichechidæ*, or walruses; the *Otaridæ*, or sea-lions or eared seals; and the *Phocidæ*, or ordinary seals.

As none of these animals have been as yet observed in the Indian seas, being chiefly denizens of cold zones, I will not attempt any further description of species, having merely alluded to them *en passant* as forming an important link in the chain of animal creation.

We must now pass on to the next order, a still more aquatic one.

ORDER CETACEA—THE WHALES.

THESE curious creatures have nothing of the fish about them, save the form, and frequently the name. In other respects they are warm-blooded, viviparous mammals, destitute of hinder limbs, and with very short fore-limbs completely enclosed in skin, but having the usual number of bones, though very much shortened, forming a kind of fin.

The fin on the back is horizontal, and not rayed and upright like that of a fish; the tail resembles that of a fish in form, the caudal vertebræ running through the middle of it. The immense muscular power of this tail, with its broad flanges, arises from the flesh of the body, terminating in long cords of tendon, running to the tip. The vertebral column is often ankylosed in the fore-part, but is extremely elastic, owing to the cartilaginous cushion between each bone in the latter half. Thus, whilst the fore-part is rigid, the hinder is flexible in the extreme. The brain is large and much convoluted; the heart is very large, and the blood-vessels extremely full and numerous, with extensive ramifications, which, being filled with oxygenated blood, assist in supporting life whilst submerged. The lungs are also very large. The laryngeal and nasal passages are peculiar. The following description is by Dr. Murie: "In front of the larynx of man we all know that there is an elastic lid, the epiglottis, which folds over and protects the air passage as food is swallowed. The side cartilages constitute the walls of the organ of voice and protect the vocal chords. Now, in the comparatively voiceless whale, the cartilages, including the epiglottis, form a long rigid cylindrical tube, which is thrust up the passage at the back of the palate in continuity with the blow-hole. It is there held in place by a muscular ring. With the larynx thus retained bolt upright, and the blow-hole being meanwhile compressed or closed, the cetacean is enabled to swallow food under water without the latter entering the lungs." The stomach is peculiar, being composed of several sacs or chambers with narrow passages between; the intestines are long, glandular and, according to Dr. Murie, full of little pouches. There is no gall bladder; the gullet is very narrow in some and wider in others. Some have teeth, others are without. The eyes are small; the ears deficient externally, though the interior small ear-bones of ordinary mammals are in these massive and exceedingly dense, so much so, as Murie observes, as to be frequently preserved fossil when other osseous structures are destroyed.

The cetacea have been divided into the *Denticete*, or Toothed Whales, and the *Mysticete*, or Whalebone Whales. The former contains the river dolphins, the ziphoid whales, the gigantic sperm whale, the sea dolphins, and the narwhal or sea unicorn. The latter contains the baleen whales.

DENTICETE—THE TOOTHED WHALES.

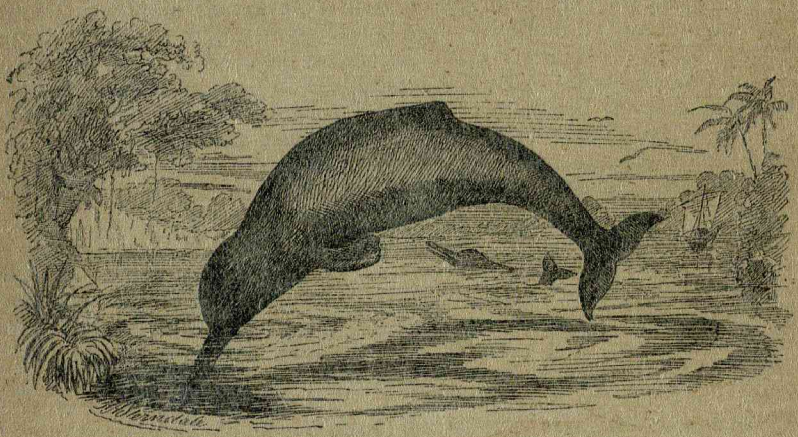
None of the larger species are found on these coasts, or in the Indian Ocean, the two most interesting of which are the gigantic sperm whales (*Physeter macrocephalus*), and the curious narwhal or sea unicorn (*Monodon monoceros*). The latter is an inhabitant of the northern seas only, but the sperm abounds in warmer waters, being frequently found

in the sub-tropical oceans. I have occasionally seen them in the South Atlantic, though they are said to have diminished there of late years. It is a wonder that the species does not get scarce in many localities, so great is the chase after them. During the last forty years the Americans alone have taken at the rate of 10,000 barrels of sperm oil per annum, or upwards of four million barrels since 1835. The sperm whale, though of such enormous bulk and courage, yet has enemies besides man. The thrasher and the killer whale both attack it, and sailors assert that the sword-fish and thrasher combine against it, the latter stabbing from below, whilst the former leaps on it with stunning blows. I think by sword-fish (*Xiphias*), which is also a large but not so very sanguinary a fish, they mean the saw-fish (*Pristis*), which is allied to the sharks, and which attacks the largest whales. The sword-fish has however the character of being pugnacious. The old sperms, especially males, will show fight at times, but the younger ones are easily alarmed, and on being molested rush off in various directions, each looking out for himself. The sperm whale is known from the others by the way in which it spouts, the jet being thrown up obliquely forwards, and it blows at regular intervals. Although the old "bulls" show a certain amount of ferocity at times, their savageness is considerably exaggerated by the whalers, who love to spin yarns about them. Having watched the habits of these and the baleen whales with curiosity, I tried to get as much information about them as I could, from the whalers, but, with the exception of the officers of whaling ships, there was much that was unreliable in Jack's notions about the sperm. On one occasion I was just too late to see one killed. The boats, under full sail, were towing the carcase towards the ship. I would have given a good deal to have seen the encounter. The food of the sperm consists greatly of the huge rock squid or cuttle-fish, which they swallow in large lumps. I have heard whalers assert that a wounded sperm in the death agony will vomit immense pieces of squid. In this respect it differs much from the baleen whales, which have a narrow gullet. According to Professor Flower there is no sufficient evidence of the existence of more than one species of sperm whales, but an allied species, *Physeter* (*Euphysetes*) *simus*, is found on the Madras coast, and to this I will allude further on.

FAMILY DELPHINIDÆ—THE DOLPHINS OR PORPOISES.

GENUS PLATANISTA—THE RIVER DOLPHINS.

A globular head with a long, compressed and, towards the end, spoon-shaped rostrum or snout; flippers short, broad and triangular; a long body of moderate girth; no back fin, but a slight elevation which takes its place. There is a decided depression between the head and body on the region of the neck; the eye is remarkably small, so much so as to be



Platanista Gangetica.

hardly perceptible; in an adult of eight feet long the whole eye-ball is no bigger than a pea, and the orifice of the ear is like a pin-hole.

The skull has peculiar features. "The apparently rounded skull behind the snout has broad, thick zygomatic arches, and above and in front of these the cheek-bones (*maxillæ*) each send forwards and inwards a great roughened sheet of bone or crest, which forms a kind of open helmet. In the large hollow between these bony plates, and somewhat behind, are situated the nasal orifices, which are slightly awry" (*Murie*).* Professor Flower's notice of the skull ('Osteology of the Mammalia') is thus worded: "The orbit is extremely small, the temporal fossa large, and the zygomatic processes of the squamosal are greatly developed. From the outer edge of the ascending plates of the maxillæ, which lie over the frontals, great crests of bone, smooth externally, but reticulated and laminated on their inner surface, rise upwards, and, curving inwards, nearly meet in the middle line above the upper part of the face."

* See Appendix B for illustration.

The dentition is also curious, the upper and lower jaws being provided with a number of teeth, pointed and conical in front, and smaller and more flattened behind. They vary in number. In an example quoted by Dr. Murie the total was 117, viz., $\frac{27-28}{30-32}$, but in a specimen examined by Dr. Anderson, who has most exhaustively described these animals, the total number of teeth amounted to 128, i.e. $\frac{33-32}{32-31}$. (See Appendix B, p. 525.)

The cervical vertebræ are movable, and not ankylosed, as in many of the cetacea; the cæcum is small; the blow-hole is a narrow slit, not transverse as in other whales, but longitudinal. I have somewhat gone out of order in Jerdon's numbering in bringing in this genus here instead of letting it follow Delphinus, as he has done. These river Dolphins naturally come after the extinct Phocodontia or seal-toothed whales, and bear considerable resemblance in the dentition to the extinct genus Squalodon.

No. 257. PLATANISTA GANGETICA.

The Gangetic Porpoise (Jerdon's Nos. 144 and 145).

NATIVE NAMES.—*Soonse*, *Soosoo*, *Soosa*, Hindi; *Susak*, *Shishuk*, Bengali; *Sisumar*, Sanscrit; *Bulhan* or *Sunsar*, on the Indus; *Hihoo*, *Siho*, Assamese; *Huhh* in Cachar and Sylhet.

HABITAT.—In the larger rivers connected with the Ganges nearly up to the hills; also in the Brahmaputra and in the Indus, but in fresh water; only it does not go out to sea.

DESCRIPTION.—"A long compressed snout with a formidable array of teeth; a vaulted compressed forehead; longitudinal blow-hole; scarcely perceptible eye; distinct neck; broad and abruptly truncated pectoral fins, and small dorsal fin; and the male, a smaller but heavier-built animal than the female, with a shorter snout" (*Anderson*). The colour is from a dark lead to a sooty black; according to Jerdon "when old with some lighter spots here and there; shining pearl-grey when dry."

SIZE.—From six to eight feet.

This animal, though not often captured, at all events in the vicinity of Calcutta, is familiar to most people who have travelled on the larger Indian rivers. It is common enough in the Hooghly. I have frequently observed it in the river abreast of the Fort whilst we were slowly driving down the Course.

I am largely indebted to Dr. Anderson for information concerning it, for he has not only most carefully watched the habits of this curious animal, but has most exhaustively described its anatomy in his 'Anatomical and Zoological Researches.' It is found in the Hooghly, chiefly in the cold weather, migrating during the hot and rainy season; at least so

was supposed, and Dr. Cantor conjectured that at such times it visited the sea, but this has been proved to be not the case. The *soosoo* never leaves fresh water; and it is in the river during the rains, for fishermen catch it in their nets, but it is hardly ever seen at that time. It rises so as to expose the blow-hole only, and the rush of the swollen waters prevents the peculiar sound of respiration being heard. But in the cold weather, when the river is calm, the ear is attracted at once by the hissing puff of expiration, and the animal may be seen to bound almost out of the water. Dr. Anderson had one alive in captivity for ten days, and carefully watched its respirations. "The blow-hole opened whenever it reached the surface of the water. The characteristic expiratory sound was produced, and so rapid was the inspiration that the blow-hole seemed to close immediately after the expiratory act." He states that "the respirations were tolerably frequent, occurring at intervals of about one-half or three-quarters of a minute, and the whole act did not take more than a few seconds for its fulfilment." But it is probable that in a free state and in perfect health the animal remains longer under water. It has certainly been longer on several occasions when I have watched for the reappearance of one in the river. The food of the Gangetic dolphin consists chiefly of fish and crustacea; occasionally grains of rice and remains of insects are found in the stomach, but these are doubtless, as Dr. Anderson conjectures, in the fish swallowed by the dolphin. The period of gestation is said to be eight to nine months, and usually only one at a time is born, between April and July. The young are sometimes caught with their mothers, and are said to cling by holding on by the mouth to the base of the parent's pectoral fins. "The flesh and blubber are occasionally eaten by many of the low caste Hindus of India, such as the Gurhwals, the Domes of Jessore and Dacca districts, the Harrees, Bourees, Bunos, Bunpurs, Tekas, Tollahas, the Domes of Burdwan and Bhagulpore, who compare it to venison; also by the Teewars and Machooas of Patna, the Mussahars of Shahabad, the Gourhs and Teers of Tirhoot, and the Mullahs of Sarun. In the North-west Provinces about Allahabad, the Chumars, Passees, Kooras, Khewuts or Mullahs, have rather a high estimate of the flesh, which they assert resembles turtle. The Koonths of Benares, Phunkeahs, Natehmurrahs, and Buahoas of Moradabad, and also such gipsy tribes as the Sainsees, Kunjars and Hubbossahs, in the neighbourhood of Meerut, do not despise it. In the Punjab we find the Choorahs, Dhapels, Sainsees, Budcus, and Burars eating the flesh; and in Sind the Kehuls. The Moras, a tribe of Mahomedan boatmen who lead a wandering life on the streams in the Punjab and in Sind, subsist on the dolphin when by good chance they catch one; this is also the case with the Cacharies and the Nagas of Assam. The Sansee women on the Indus eat the flesh under the idea that it makes them prolific. All along the Ganges, Bramahputra,

and Indus, the oil is universally considered as of great value as an embrocation in rheumatism and for giving much strength when rubbed on the back and loins. But many other animal oils, such as those of various species of turtle, the crocodile, and the pelican, have a similar reputation. It is said to be of a very penetrating nature, and, owing to this property, it is highly prized for preserving leather, such as harness, &c. The illuminating powers of this oil are said to be very high." (Anderson's 'Anatomical and Zoological Researches.')

Jerdon gives, on the authority of Blyth, another species, *Platanista Indi*, or the Indus porpoise, but Dr. Anderson has conclusively proved that this is identical with the Gangetic dolphin. The dentition of the *soosoo* is most curious. The perfect tooth in the young animal is sharp and pointed, but as the creature advances in age the fangs get broader, and the point wears down, till in old age the crown is so worn as to leave but a bony lump in its place.

GENUS ORCELLA—THE ROUND-HEADED RIVER DOLPHINS.

The generic characteristics of these dolphins are, according to Dr. Anderson, as follows: "Head globular; dorsal fin low, situated behind the middle of the body; pectoral fins oval, about one-sixth the length of the animal; teeth conical, large, and fewer in the lower than in the upper jaw, thirteen to seventeen teeth in the upper and twelve to fourteen teeth in the lower jaw; skull beaked; beak broad at the base, anteriorly pointed; premaxillary not much laterally dilated, bearing one tooth; vertebræ sixty-two to sixty-three; first two cervical vertebræ ankylosed; lumbar transverse process moderately long; vertebræ ribs twelve to thirteen, with one or two free ribs; pelvic bones opposite thirty-fifth and thirty-sixth vertebræ."

These are the dolphins which were procured by Mr. Blyth in the Hooghly, and were supposed by him to be the young of the ca'ing whale (*Globicephalus*), which idea has also been adopted by Jerdon; but it has been since proved that the skeletons prepared from these supposed young whales are those of adults fully matured, and not of young animals, which have certain resemblances to *Globicephalus* as well as to the killer whales, *Orca*, from which the generic name has been derived, but yet was undoubtedly distinct. The killer whales have a very high dorsal fin in the middle of the back, with very large pectoral flippers as broad as long; in *Orcella* the back fin is low and behind the middle of the body, and the pectoral fin is only half as broad as long. In the ca'ing whale the back fin is more towards the shoulders, and the flippers are long and narrow; the genus *Orcella* in fact seems to be intermediate between the dolphin and the ca'ing whale, combining the

head of *Globicephalus* with the body of *Delphinus*. Dr. Anderson, however, points out further differences than the external ones I have above alluded to. *Orca*, he says, is distinguished by a "more powerfully built skeleton, with considerably fewer vertebræ, there being only a maximum of fifty-three in it to a maximum of sixty-three in *Orcella*." In *Orca* generally four or five cervical vertebræ are ankylosed as in the cachelots, but in the two species of *Orcella* only the atlas and axis are joined. "In the killers and ca'ing whales the ribs are transferred to the transverse processes at the seventh dorsal, whilst in *Orcella* the transference does not take place until the eighth." The skull resembles that of *Orca* in the breadth of the upper jaw being produced by the maxillaries, whereas in *Globicephalus* this effect is caused by the premaxillaries. The teeth resemble the killer's.

As I have said so much about the killer whale, I may digress a little to explain what it is, though it is not a denizen of the Indian seas. It is to the Cetacea what the shark is to fishes—a voracious tyrant with a capacious mouth, armed with formidable teeth. It hesitates not to attack the largest sperm and Greenland whales, and the smaller whales, porpoises and seals will spring out of water and strand themselves on shore in terror at its approach. It ranges from twenty to thirty feet in length, and is of so gluttonous a character that in one recorded case a killer had been found choked in the attempt to swallow a *fifteenth* seal, the other fourteen, with thirteen porpoises, being found in its stomach!

According to Scammon three or four of them do not hesitate to grapple with the largest baleen whale; and, as described by Dr. Murie, "the latter often, paralysed through fear, lie helpless and at their mercy. The killers, like a pack of hounds, cluster about the animal's head, breach over it, seize it by the lips, and haul the bleeding monster under water; and, should the victim open its mouth, they eat its tongue." In one instance he relates that a Californian grey whale and the young one were assaulted; the *Orcas* killed the latter, and sprang on the mother, tearing away large pieces of flesh, which they greedily devoured.

"These brutes have been known to attack a white-painted herring boat, mistaking it for a beluga; and it is stated that occasionally they will boldly lay siege to whales killed by the whalers, almost dragging them perforce under water. Near some of the Pacific sealing grounds they continually swim about, and swoop off the unwary young; even the large male sea-lions hastily retreat ashore and give these monsters a wide berth. The walrus also, with his powerful tusks, cannot keep the killers at bay, especially if young morses are in the herd. The cubs on such occasions will mount upon the mother's back for refuge, clinging for dear life, but the *Orca*, diving, comes suddenly up with a

sp[...]ful thud, and the cub, losing its balance, falls into the water, when in an instant it is seized by the remorseless whales." The speed of the killer whale is immense, as may be supposed when it can overtake the swift dolphins, which it catches and swallows alive. It has also been seen chasing salmon up the mouths of rivers.

The genus *Orcella* seems to come in between the sea and river dolphins, although *Orcella fluminalis* of Dr. Anderson is a purely fluviatile animal, which apparently never goes out to sea.

No. 258. ORCELLA BREVIROSTRIS.

The Short-nosed Round-headed River Dolphin.

HABITAT.—The estuaries of the Ganges and Brahmaputra rivers.

DESCRIPTION.—"The head is convex from the blow-hole to the upper lip, but its sides immediately below the angle of the mouth are somewhat anteriorly convergent, but rounded; the gape posteriorly has a long upward curve; the eye, which is well developed, is near the angle at the gape, and in the adult is placed about one inch above it, with a slightly downward slope; the ear is nearly on the same level as the angle of the mouth, but is extremely small, crescentic, and not measuring more than 0·12 inch in diameter. The posterior margin of the blow-hole is immediately behind the anterior angle of the eye; the blow-hole is crescentic and unsymmetrical, being more to the left than to the right side; there are two slight eminences about one inch behind the blow-hole; the construction of the neck occurs below the ear and slightly behind it" (Anderson's 'Anatomical and Zoological Researches,' p. 370). The other characteristics are triangular flippers half as broad as long. The back fin rises behind the centre of the back; it is comparatively small, falcate, curved over the top to a blunt point, and concave behind. The line of the back is sharp from this fin down to the tail. The ventral line is the same for some inches behind the anus. The colour is dark slaty-blue above, almost black, a little paler below, without any streaks or marks, such as in *O. fluminalis* and Risso's grampus.

SIZE.—From snout to caudal notch, about 7 feet.

I cannot find much on record concerning the habits of this dolphin, and my own acquaintance with it is too limited for me to afford much original information.

No. 259. ORCELLA FLUMINALIS (*Anderson*).

The Fresh-water Round-headed Dolphin.

HABITAT.—The Irrawaddy river; Burmah.

DESCRIPTION.—This differs from the last in a "rather smaller, lower, and more falcate dorsal fin, its more pointed and less anteriorly bulging

head, and rather shorter and broader pectoral fins" (*Anderson*). The colour is a pale bluish above, and white underneath, with numerous streaks, as in Risso's grampus.

SIZE.—From 7 to 7½ feet from snout to fork of tail.

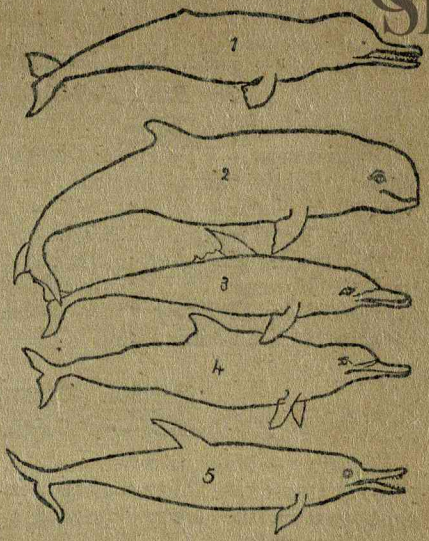
Dr. Anderson, who has fully described this species, says that he has "never observed it in tidal waters, so that it is even more strictly fluviatile than the Gangetic dolphin. From a little below Prome to as far up as Bhamo, which is about 550 miles, as the crow flies, from the sea, these animals abound. It is asserted by the Shans of Upper Burmah that these dolphins are not to be found beyond a point thirty miles above Bhamo, where the course of the river is interrupted by rocks, and which they style *Labine* or Dolphin Point, from the circumstance that, according to them, it is the residence of certain *Nâts*, who there impose so heavy a toll on dolphins as to deter them from proceeding upwards."

This dolphin is somewhat like its marine cousins, being fond of gambolling round the river steamers. Solitary ones are seldom met with, usually two or three being together. When they rise to breathe the blow-hole is first seen; then, after respiration, the head goes down, and the back as far as the dorsal fin is seen, but rarely the tail flippers. They rise to breathe every 70 to 150 seconds, and the respiratory act is so rapid that it requires a very expert marksman to take aim and fire before the animal disappears.

Dr. Anderson says: "I have observed some of them disporting themselves in a way that has never yet been recorded of *Cetacea*, as far as I am aware. They swam with a rolling motion near the surface, with their heads half out of the water, and every now and then nearly fully exposed, when they ejected great volumes of water out of their mouths—generally straight before them, but sometimes nearly vertically. The sight of this curious habit at once recalled to me an incident in my voyage up the river, when I had been quite baffled to explain an exactly similar appearance seen at a distance, so that this remarkable habit would appear to be not uncommonly manifested. On one occasion I noticed an individual standing upright in the water, so much so that one-half of its pectoral fins was exposed, producing the appearance against the background as if the animal was supported on its flippers. It suddenly disappeared, and again, a little in advance of its former position, it bobbed up in the same attitude, and this it frequently repeated. The Shan boatmen who were with me seemed to connect these curious movements with the season—spring—in which the dolphins breed."

A similar thing has been noticed in the case of marine dolphins off the coast of Ceylon by Mr. E. W. H. Holdsworth, whose observations confirm the opinion of the Shan boatmen. (See 'P. Z. S.' 1872, p. 586.)

"The food of the Irrawady dolphin is apparently exclusively fish. The fishermen believe that the dolphin purposely draws fish to their nets, and each fishing village has its particular guardian dolphin, which receives a name common to all the fellows of his school, and it is this supposition that makes it so difficult to obtain specimens of this cetacean. Colonel Sladen has told me that suits are not unfrequently brought into the native courts to recover a share in the capture of fish in which a plaintiff's dolphin has been held to have filled the nets of a rival fisherman" (*Anderson*). This reminds me that in the surveying voyage of the *Herald*, as related by Mr. H. Lee, the natives of Moreton Bay entreated the seamen not to shoot their tame porpoises, which helped them in their fishing.



1. Gangetic Dolphin—*Platanista Gangetica.*
2. Round-headed River Dolphin — *Orcella brevirostris.*
3. Gadamu Dolphin—*Delphinus Gadamu.*
4. Freckled Dolphin—*Delphinus lentiginosus.*
5. Black Dolphin—*Delphinus pomeegra.*

GENUS DELPHINUS—THE MARINE DOLPHINS.

These are characterised by a convex forehead, with a protruding muzzle which forms a sort of beak; they have teeth in both jaws, numerous and conical, broad and high cranium, nasal passages vertical, no cæcum. They are gregarious in habit, carnivorous and extremely swift, but they must not be confounded with the dolphin of sailors, which is a true fish (*Coryphæna hipparis*) of great velocity and brilliant colours, which change like rainbow tints when the fish is dying. I have several times in vain tried to catch the fleeting shades with both oil and water-colours, but without success; for within a few minutes they change from the most vivid of greens and blues to a pale silvery grey. The true dolphin, of which we are treating, is the dolphin of the ancients, represented in all the old pictures and sculptures. They have a medium dorsal fin, and the pectoral flippers are about two-thirds longer than the breadth.

No. 260. DELPHINUS PERNIGER.

The Black Dolphin (*Jerdon's No.* 142).

HABITAT.—Bay of Bengal.

DESCRIPTION.—"Twenty-six teeth on each side above and below, obtuse, slightly curved inwards; of a uniform shining black above, beneath blackish."—*Jerdon.*

SIZE.—Total length, 5 feet 4 inches.

This species was taken in the Bay of Bengal and sent to the Asiatic Society's Museum by Sir Walter Elliot, but it does not appear to be mentioned by Professor Owen in his notice of the Indian Cetacea collected by Sir Walter Elliot.

No. 261. DELPHINUS PLUMBEUS.

The Lead-coloured Dolphin (*Jerdon's No.* 143).

HABITAT.—Malabar coast.

DESCRIPTION.—Thirty-six teeth in each side in the upper jaw and thirty-two in the lower jaw; of a uniform leaden colour, with the lower jaw white.

SIZE.—About 8 feet.

Whether this be the same as or a different species to the next I am unable to say, as the description is meagre, and the number of teeth vary so much in the same species that no definite rule can be laid down on them.

The following are the species named by Professor Owen and collected by Sir Walter Elliot.

No. 262. DELPHINUS GADAMU.

NATIVE NAME.—*Gadamu.*

HABITAT.—Madras coast.

DESCRIPTION.—Body fusiform, gaining its greatest diameter at the fore-part of the dorsal fin, decreasing forward to the head by straight converging lines, and with a gentle convex curve to the eyes and blow-hole; the forehead descends with a bold convex curve; the sides of the head converge from the eyes to the base of the snout, which is divided from the forehead by a transverse groove extending almost horizontally to the angles of the mouth, and it equals in length the distance from the base to the eyes, which is five inches and a-half; the lower jaw projects a little beyond the upper; the blow-hole is crescentic, in a line with the eyes, exactly in the middle of the head, with the horns

the crescent pointing towards the snout; the pectoral and dorsal fins are falcate and about equal in size; the colour is a dark plumbeous grey, almost black upon the fins, especially at their fore-part; the body below being of a pinkish ashy-grey, with a few small irregular patches of light plumbeous grey.

The dentition varies from $\frac{24-24}{24-24} = 96$, to $\frac{23-23}{27-28} = 101$, and $\frac{27-27}{27-27} = 108$.

SIZE.—About seven feet from snout to fork of tail; girth about 3 feet 9 inches.

No. 263. DELPHINUS LENTIGINOSUS.

The Freckled Dolphin.

NATIVE NAME.—*Bolla Gadimi*, Telegu.

HABITAT.—Madras coast.

DESCRIPTION.—Body fusiform, as in the last, but with smaller pectoral and dorsal but larger caudal fin; the back is straighter and not so much rounded on the shoulders, and the colour is bluish-cinerous or slaty, freckled with small irregular spots of brown or plumbeous, and longitudinal streaks of the same flecked with white; the under parts a shade lighter than rest of the body. The snout is six inches in length.

Dentition : $\frac{32-32}{32-33} = 129$.

SIZE.—Seven to eight feet; girth four feet.

No. 264. DELPHINUS MACULIVENTER.

Spot-bellied Dolphin.

NATIVE NAME.—*Suvva.*

HABITAT.—Madras coast.

DESCRIPTION.—Forehead more convex than even *D. gadamu*, and head proportionately larger and body deeper. A deep shining plumbeous black on the upper part, becoming paler near the belly, which from the underpart of the jaw to the perineum is ashy-grey, with irregular spots and blotches.

Dentition : $\frac{27-27}{30-30} = 114$.

SIZE.—About seven feet.

No. 265. DELPHINUS FUSIFORMIS.

The Spindle-shaped Dolphin.

HABITAT.—Madras coast.

DESCRIPTION.—More slender in proportion to its length; a less elevated and less convex forehead than the last species; a proportionally thicker,

broader, and more obtusely terminated snout; a deeper mandible or under jaw, especially posteriorly, and smaller dorsal and pectoral fins, especially the latter. The greatest girth is in middle or fore-part of the dorsal fin, from which the body tapers to both ends, presenting the true spindle form. Colour plumbeous, lighter below, darkest on the fins and snout.

Dentition: $\frac{22-22}{21-21}$ = 86 teeth.

Size.—About six feet.

No. 266. DELPHINUS POMEEGRA.

The Black or Pomeegra Dolphin.

NATIVE NAME.—*Pomeegra.*

HABITAT.—Madras coast.

DESCRIPTION.—More slender than any of the foregoing species; longish snout, with 173 teeth, viz. $\frac{41-41}{45-46}$. It is well to note the irregularity here, not only an odd number, but the lower jaw has the greater number, whereas it is generally the other way. Colour almost black, lighter beneath. Professor Owen's description is not so full as in other cases, but from the illustration it seems that the flukes of the caudal fin are longer, and the posterior edge of the dorsal straighter than in the others.

No. 267. DELPHINUS LONGIROSTRIS.

The Long-snouted Dolphin.

HABITAT.—Indian Ocean; coast of Ceylon.

DESCRIPTION.—Similar to the last, but with a longer and more slender snout.

No. 268. DELPHINUS VELOX.

This is also given by Dr. Kellaart as a species found on the coast of Ceylon.

Sir Walter Elliot mentions another species of dolphin, of which he had lost the drawing, about thirty-two inches long, of a uniform black colour, small mouth, and no dorsal fin, called by the Tamil fishermen *Molagan.*

GENUS PHOCÆNA—THE PORPOISES.

No beak or rostrum; snout short and convex; numerous teeth in both jaws. Kellaart testifies to the existence of a true porpoise on the coasts of Ceylon—which he identifies with *Phocæna communis*—of a blackish colour above and whitish beneath.

GENUS GLOBICEPHALUS—THE CA'ING OR PILOT WHALE.

Head globular in front; teeth few in number; the dorsal fin is high, situated nearer to the head than to the tail; the flippers very long and narrow; the fingers possessing an unusually large number of bones.

No. 269. GLOBICEPHALUS INDICUS.

The Indian Ca'ing Whale (*Jerdon's No.* 146).

HABITAT.—Bay of Bengal.

DESCRIPTION.—Body cylindrical, tapering to the tail; dorsal fin high, falcate, and placed about the middle of the body proper, excluding the tail portion; the forehead with a prominent boss over the snout, which is short; pectoral fins long and narrow; colour uniform leaden black, paler beneath.

SIZE.—Fourteen feet, flippers 2 feet; dorsal fin, 2¼ feet long, 11 inches high; tail flukes, 3 feet broad.

Blyth's specimens were procured in the Salt Lakes near Calcutta. It was for the young of this that he mistook *Orcella brevirostris*.

PHYSETERIDÆ—THE CACHELOTS OR SPERM WHALES.

GENUS EUPHYSETES.

No. 270. PHYSETER *or* EUPHYSETES SIMUS.

The Snub-nosed Cachelot.

NATIVE NAME.—*Wonga*, Telugu.

HABITAT.—Bay of Bengal.

DESCRIPTION.—The general form of this animal resembles the porpoise, but the position of the mouth at once distinguishes it. It is small and situated, like that of the shark, considerably under the blunt rostrum, so much so as to lead one to conjecture whether or not it turns on its back in seizing its prey, as do the sharks. The blow hole is crescentic, but eccentrically placed to the left of the middle line of the head, and the horns of the crescent are turned diagonally backwards —that is to say, the lower limb points to the back whilst the upper one touches the middle line and points across; the eye is small; the pectoral fins are triangular, about one foot in length and four and a-half inches broad in the male, and four inches in the female; the dorsal fin is sub-falcate, standing about a foot high, and is nine to ten inches broad at the base; the male being the broader; the colour is a shining black above, paler and pinkish below.

Dentition: $\frac{1-1}{9-9} = 20$.

SIZE.—Six to seven feet.

The peculiarity of this cetacean is the preponderance of the cranial over the rostral part, more so, as Professor Owen remarks, than in any other species. The asymmetry of the bones too is remarkable, although this is characteristic of all the catodon whales, especially as regards the bones of the anterior narial passages, the left of which is very much larger than the right. This is also the case in the large sperm whale, but in *Euphysetes* the disproportion is still greater. In a notice on a New Zealand species (*E. Pottsii*), by Dr. Julius Haast, he gives the difference as fifteen times the size of the right aperture; the mouth is also peculiar from its position and small size, being very much overshot by the snout. It may, as Dr. Haast supposes, be a ground feeder, existing on the smaller hydroid zoophytes, otherwise it must, I think, turn on its side in seizing its prey.

MYSTICETE—WHALEBONE OR BALEEN WHALES.

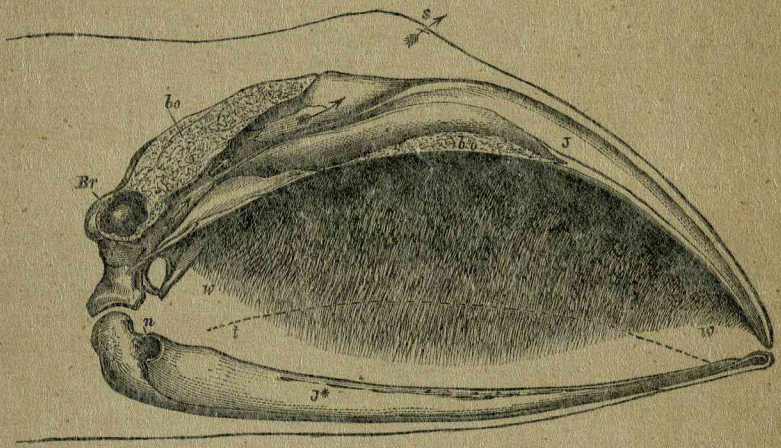
GENUS BALÆNA—THE RIGHT WHALES.

They are distinguished from the last group by their enormous heads, with more symmetrical skulls, the facial portion of which is greatly in excess of the cranial. The bones of the lower jaw are not united at the symphysis, but are held together by strong fibrous bands; the two rami are very much rounded and arched outwards; there are no teeth. The maxillary and premaxillary bones are much produced, forming a rostrum tapering, narrow, compressed and much arched in the right whales. From this depends the mass of whalebone, which grows from a fleshy substance "similar," as is aptly described by Dr. Murie, "to the roots of our finger-nails. It grows continuously from the roots like the latter, and in many respects corresponds, save that the free end is always fringed. Baleen, therefore, though varying from a few inches to a number of feet long, in fact approximates to a series of, so to say, mouth nail-plates, which laminæ have a somewhat transverse position to the cavity of the mouth, and thus their inner split edges and lower free ends cause the mouth to appear as a great hairy archway, shallower in front and deeper behind" (Cassell's Natural History).

The object of this vast amount of whalebone is to strain from the huge gulps of water the mollusca, &c., on which this animal feeds. The tongue of these whales is very large, filling up the space between the lower jaws. The gullet is small in comparison. The nasal aperture differs from the *Denticete* in being symmetrical, that is, having the

double aperture, and in being directed forwards as in most mammals, instead of upwards and backwards as in the dolphins. The whale produces generally one at a birth, which it suckles for some length of time. The mammæ are pudendal. The right whales have no fin on the back; those that have form a separate genus, *Balænoptera*, i.e. fin-whales.

They are the most valuable of the cetacea, except perhaps the cachelot or sperm whale, as producing the greatest amount of oil and whalebone. Of the various species the most sought after is the Greenland or right whale (*Balæna mysticetus*), which ordinarily attains a length of fifty to sixty feet. An average whale between forty and fifty feet in



Br, brain cavity; J J*, upper and lower jawbones; the arrows indicate narial passages; S, spout-hole; W, whalebone; *t*, tongue in dotted line; *n*, nerve aperture in lower jaw; *bo*, bone sawed through.

Skull of Baleen Whale.

length will yield from sixty to eighty barrels of oil and a thousand pounds of baleen.

Formerly all whaling vessels were sailers, but now powerful steamships are used, and the harpoon often gives way to the harpoon gun. A whale, when struck, will sometimes run out a mile of line before it comes up again, which is generally in about half an hour. The whalers judge as best they can, from the position of the line, in which direction he will rise, and get as near as possible so as to use the lance or drive in another harpoon. When killed, the animal is towed to the vessel and fastened on the port side, belly uppermost, and head towards the stern; it is then stripped of its blubber, the body being canted by tackles till

parts are cleared. The baleen is then cut out, and the carcase abandoned to the sharks, killer whales, and sea birds.

The baleen whales are not found in the intertropical seas. Of the known species there are the Greenland whale (*B. mysticetus*), the Biscay whale (*B. Biscayensis*), the Japan whale (*B. Japonica*), the Cape whale (*B. australis*), and the South Pacific whale (*B. antipodarum*).

GENUS BALÆNOPTERA—FINBACK WHALES OR RORQUALS.

Are distinguished by their longer and narrower bodies, smaller heads, being one-fourth instead of one-third the length of the body, smaller mouths, shorter baleen, plaited throats, and smaller flippers; they have a dorsal fin behind the middle of the back, and the root of the tail is compressed laterally. They also present certain osteological differences from the right whales; the latter have the whole of the seven cervical vertebræ anchylosed, that is to say generally, for sometimes the seventh is free. In the finbacks the cervical vertebræ are, as a rule, all distinct and free, although occasionally anchylosis may take place between two or more of them. The sternum of the *Balæna* consists of a broad, flattened, heart-shaped or oval presternum. "In the fin whales (*Balænoptera*) it is transversely oval or trilobate, with a projecting backward xiphoid process" (*Professor Flower*). The ulna and radius in the rorquals are also comparatively longer than in the baleen whales. In the skull the supraorbital processes of the frontals are broader in the rorquals than in others, and the olfactory fossa is less elongated.

They are more muscular and active animals than the right whales, and have a less amount of blubber and much shorter whalebone, consequently are not so much sought after by whalers, as the risk in attacking them is not compensated for by the commercial results. Many of them grow to enormous size, far exceeding any of the baleen whales. The common rorqual, razorback, or pike-whale of the English coasts (*B. musculus*) attains a length of seventy feet; it is black above and pure white below. The sulphur-bottom whale (*B. sulfureus*) is known by its yellowish belly, and with Sibbald's whale (*B. Sibbaldii*) grows to a length of one hundred feet, to which size our Indian species also approaches.

No. 271. BALÆNOPTERA INDICA.

The Indian Rorqual (*Jerdon's No.* 147).

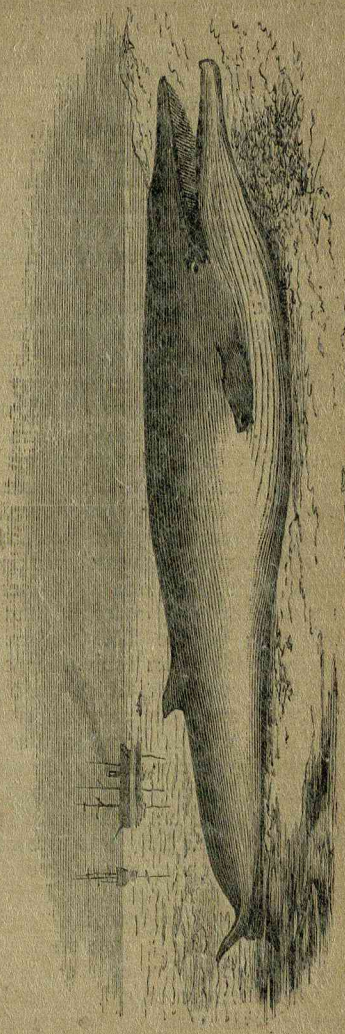
HABITAT.—The Indian Ocean.

DESCRIPTION.—External characteristics those of the genus, but from Mr. Blyth's observations the lower jaw of this species is more slender

in proportion to its size than that of any other rorqual or even right whale.

SIZE.—Up to 90 and possibly 100 feet.

There is a most interesting article on the great rorqual of the Indian Ocean by Mr. Blyth in the 'Journal of the Asiatic Society' for 1859, p. 481. He notices that the existence of great whales was known to and recorded by the ancients. Nearchus, the commander of Alexander's fleet, which sailed from the Indus to the Persian Gulf in B.C. 327, mentions having met with them, and that on the coast of Mekran the people constructed houses of the bones of stranded whales. In modern times an occasional one gets on shore, as was the case with one at Chittagong in 1842, another on the Arakan coast in 1851. In 1858 one of 90 feet was stranded at Quilon on the west coast, as reported by the Rev. H. Baker of Aleppi, who also mentions that one, said to be 100 feet long, was cast ashore some years previously. He writes to Mr. Blyth: "Whales are very common on the coast. American ships, and occasionally a Swedish one, call at Cochin for stores during their cruises for them; but no English whalers ever come here that I have heard of."



Rorqual.

I wonder at any whaling vessel coming out of their way after this species, for I have always heard from whalers that the finback is not worth hunting. It is possible that in cruising after sperms they may go a little out of their way to take a finback or two. However, to return

Blyth's remarks. Of the whale stranded on the Arakan coast a few bones were sent to the Society's Museum in Calcutta; they consisted of the two rami of the lower jaw, measuring 20 feet 10 inches, a right rib, the left radius, and five vertebræ, which are now to be seen at the Indian Museum. He writes as follows on them: "The proportional length of the radius indicates the animal to have been a Balænoptera or rorqual, while the remarkable slenderness of the lower jaw suffices to prove it a distinct species from any hitherto-described rorqual."

The finback does not confine itself entirely, or even chiefly, as stated by Blyth, to a diet of *Cephalapoda*, but is a fish-eater to boot, doing great damage to shoals of such fish as cod, herrings, &c., as many as six to eight hundred fish having been found in the stomach of one.

They are not particularly shy, and will sometimes follow a vessel closely for days. I read not very long ago an account in one of the Indian newspapers of a steamer running over one of these animals, and nearly cutting it in two; the agony of the poor brute as he struggled in the water, vainly trying to sound, was graphically described. A similar adventure occurred some years ago to the B.I.S.N. Company's steamer *Euphrates*, on a voyage from Kurrachee to Bombay, when about sixty miles from the latter place. The captain writes: "It appears that the animal had for about half an hour amused itself by crossing and recrossing the bow, and then at last suddenly turned and came straight for the vessel, striking us about ten feet from the stem. It struck with such force as to send a considerable quantity of spray on deck. The only other instance that has occurred here lately was in the case of the S.S. *Dalhousie*, when about twelve miles from Kurrachee; it was in September of last year, and the Bombay papers had a full account of it at the time." I am indebted to my friend Mr. M. C. Turner for this and some other interesting letters on this subject. Captain A. Stiffe, of the late Indian Navy, writes regarding the drowning of a whale by entanglement with a submarine cable, off the coast of Mekran: "The telegraph cable was broken, and a dead whale hove up to the surface, with three turns of cable round the neck of his tail, by which he was drowned. I had the three turns in my office at Kurrachee, and there they are now I dare say. I don't remember any more details. There are always shoals of whales about that part, and it is supposed a 'bight' of the cable lying off the ground got wound up like a rope round a screw." I myself was in a sailing vessel going about five or six knots, when a whale played about for a time, and then rose and spouted just under the bow, covering the forecastle with spray. The captain, who was standing by me, quite expected a shock, and exclaimed—"Look out! hold on!"

SIRENIA—THE MANATEES.

This group contains the *phytophagous* or *herbivorous* cetacea. Their teeth have flat crowns, and they live on aquatic vegetation, though, according to Cuvier, they sometimes leave the water for pasture on shore, but this has not been authenticated, and is probably a mistake. The other characteristics of the group are pectoral mammæ and hairy moustaches. The anterior narial aperture in the skull opens upwards, but the orifices of the nostrils are placed at the end of the muzzle. The stomach is complex, being divided into four sacs, and they have a large cæcum. The flippers are broad, and the animal uses them with some dexterity in supporting its young in the act of suckling. As at such times they frequently raise the upper part of the body out of water, they have given rise to the ancient fables regarding mermaids and sirens. There is something human-like, although repulsive, in the aspect of these creatures, especially in the erect attitude just alluded to. No wonder the ancient mariners, with their restricted knowledge and inclination to the marvellous, should have created the fabulous mermaid, half-fish and half-woman, and have peopled the rocks and seas of Ceylon with seductive sirens with imaginary flowing tresses and sweet ensnaring voices. As regards the latter it may be that the strange phenomena related by Sir Emerson Tennent, of musical sounds ascending from the bottom of the sea, and ascribed by him to certain shell-fish, gave rise to the mermaid's song. Sir Emerson's account has in itself a touch of the romantic and marvellous. He says: "On coming to the point mentioned I distinctly heard the sounds in question. They came up from the water like the gentle thrills of a musical chord, or the faint vibrations of a wineglass when its rim is rubbed by a moistened finger. It was not one sustained note, but a multitude of tiny sounds, each clear and distinct in itself, the sweetest treble mingling with the lowest bass. On applying the ear to the wood-work of the boat the vibration was greatly increased in volume." Similar sounds have been heard elsewhere in the Indian seas, and doubtless the ancients connected this mysterious music of the ocean with the animals round which they had thrown such a halo of romance. But to return to the prose of the subject. The Sirenia consists of the Manatees (*Manatus*), the Dugongs (*Halicore*), and the Stellerines (*Rhytina*); the latter is almost extinct; it used to be found in numbers in Behring Straits, but was exterminated by sailors and others, who found it very good eating. The Manatee inhabits the African and American coasts, along the west coast of the former continent, and in the bays, inlets, and rivers of tropical America, but the one with which we have to do is

the dugong or halicore, of which the distribution is rather widespread, from the Red Sea and East African coasts to the west coast of Australia. The latter country possesses an organised dugong fishery, which bids fair to exterminate this harmless animal. They are prized for the excellent quality of the oil they yield, which is clear and free from objectionable smell.

GENUS HALICORE—THE DUGONG.

Have grinders of two cones laterally united. The premaxillary region is elongated and bent downwards, overlapping the very deep lower jaw, which is similarly bent down. They have ordinarily two incisors in the upper jaw, none in the lower. No canines, and molars $\frac{3-3}{3-3}$, total fourteen teeth. The incisor tusks in the bent-down upper jaw are longer in the male, and sometimes project beyond the thick fleshy lips, but in the female they are small. The head is round, the lips thick and bristled with moustaches, the body is elongated, and the tail terminated by a crescent-shaped flapper.

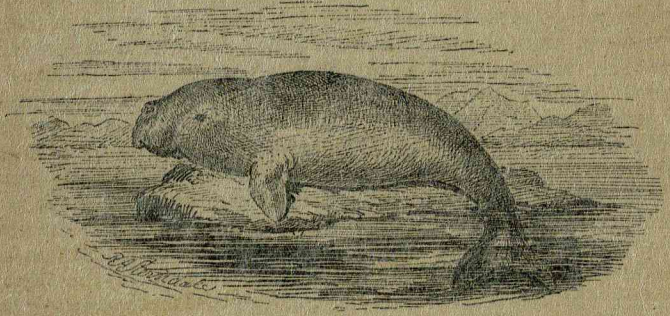
No. 272. HALICORE DUGONG. (*Jerdon's No.* 240.)

The Dugong.

NATIVE NAME.—*Mooda Oora*, Singhalese.

HABITAT.—Indian Ocean off Ceylon.

DESCRIPTION.—Body pisciform, terminated by a horizontal fin with



Halicore dugong.

two lobes; colour slaty brown above, sometimes bluish black, whitish below.

SIZE.—From 5 to 7 feet long usually, but said to reach 10.

Dr. Kellaart says that at an early age this animal has as many as 32 teeth, viz. inc. $\frac{4}{8}$, and molars $\frac{5-5}{5-5}$, but when adult there are only 14, as mentioned above. The molars, according to Dr. Murie, succeed each other, the fore ones dropping out, and others from behind taking their places. It feeds on fucus and other seaweeds, and the flesh is considered good eating, and not unlike veal or, some say, pork. They are lethargic in disposition, and in those countries where they have been unmolested they are so fearless of man as to allow themselves to be handled—a confidence somewhat betrayed by the natives, who on such occasions manage to abstract the fattest calves, which are considered a delicacy.

ORDER RODENTIA.

THE GNAWERS.

THIS order, GLIRES of Linnæus and his followers, is composed of animals, chiefly of small size, which differ from all others by the peculiarity of their teeth. No one, even though he be most ignorant of comparative anatomy, could mistake the rat or rabbit-like skull of a rodent for that of any other creature. The peculiar pincer-like form of the jaws, with their curved chisel-shaped teeth in front, mark the order at a glance. There is no complexity in their dentition. There are the cutters or incisors, and the grinders; and of the cutters there are never more than two in each jaw, that is to say efficient and visible teeth, for there are in some species rudimentary incisors, especially in the young, but these either disappear or take no part in work. Between the grinders and incisors are toothless gaps. The formation and growth of the teeth are peculiar; and it is strange that the gigantic elephant should be the nearest approach to these small creatures in this respect. The teeth—in most cases the grinders, but always the incisors—grow continuously from a persistent pulp, and therefore loss from attrition is kept constantly supplied by growth from behind. The incisors are planted in a socket which is the segment of a circle. These segments are not equal in both jaws. The lower one is a small segment of a large circle, the upper one is the reverse, being a larger segment of a smaller circle. The angle at which they meet is always the same. Some curious malformations are occasionally found which illustrate the growth of these teeth. Should by any chance, accident or design, one of these incisors get diverted from its proper angle and not meet with the friction which is necessary to keep it in its normal condition, it goes on growing and growing, following its natural curve till it forms a ring, or by penetra-

the mouth interferes with the animal's feeding. A case is recorded by Blyth of a rat which had an eye destroyed by a tooth growing into it. Here again occurs a similarity to the elephant, whose tusks grow in the same manner, and if abnormally deflected will occasion, as in the case of one lately described to me, serious hindrance to the movement of the trunk. The incisors of rodents are composed of dentine coated in front with a layer of hard enamel, the other surfaces being without this protection, except in the case of some, amongst which are the hares and rabbits, which have a thin coating as well all over. These forms are those with rudimentary incisors, and constitute the links connecting the other mammalia with the Gnawers.

The molars are much alike in structure, and can hardly be divided, as they are by some naturalists, into molars and premolars. They take the three hindmost as molars, regarding the others as premolars. Sometimes these grinders have roots, but are more commonly open at the end and grow from a permanent pulp. They are composed of tubular and convoluted portions of enamel filed up with dentine, and their worn surfaces show a variety of patterns, as in the case of the Proboscidea. These enamelled eminences are always transverse, and according to Cuvier those genera in which these eminences are simple lines, and the crown is very flat, are more exclusively frugivorous; others, in which the teeth are divided into blunt tubercles, are omnivorous; whilst some few, which have no points, more readily attack other animals, and approximate somewhat to the Carnivora.

The head is small in proportion to the body, the skull being long and flat above; the nasal bones are elongated; the premaxillaries very large on account of the size of the incisor teeth, and the maxillaries are, therefore, pushed back; the zygomatic arch is well developed in most, but is in general weak; the orbit of the eye is never closed behind; the tympanic bulla is very large; the jaw is articulated in a singular manner; instead of the lateral and semi-rotary action of the Herbivora, or the vertical cutting one of the flesh-eating mammals, the rodent has a longitudinal motion given by the arrangement of the lower jaw, the condyle of which is not transverse, but parallel with the median line of the skull, and the glenoid fossa, or cavity into which it fits, and which is situated on the under side of the posterior root of the zygoma, is so open in front as to allow of a backwards and forwards sliding action. The vertebral column is remarkable for the great transverse processes directed downwards, forwards, and widening at the ends. In the hare these processes are largely developed; the metapophyses or larger projections on each side of the central spinous process are very long, projecting upwards and forwards; the anapophyses or smaller projection in rear of the above are small; and the hypapophyses or downward processes are remarkably long, single and compressed;

According to Professor Flower these latter are not found in the Rodentia generally. The tail varies greatly, being in some very small indeed, whilst in others it exceeds the length of the body; the sternum or breast-bone is narrow and long, and collar-bones are to be found in most of the genera; the pelvis is long and narrow. In most cases the hind limbs are longer and more powerful than the fore-limbs; in some, as in the jerboas (*Dipus*) and the Cape jumping hare (*Pedetes caffer*), attaining as disproportionate a length as in the kangaroos, their mode of progression being the same; the tibia and fibula are anchylosed; the fore-limbs in the majority of this order are short, and are used as hands in holding the food to the mouth, the radius and ulna being distinct, and capable of rotatory motion. The feet have usually five toes, but in some the hind feet have only four, and even three. In point of intelligence, the rodents do not come up to other mammals, being as a rule timid and stupid; the brain is small and remarkably free from convolution. The cerebellum is distinctly separated from and not overlapped by the hemispheres of the cerebrum; the organs of smell, sight and hearing are usually well developed; the stomach is simple or in two sacs; the intestinal canal and cæcum long. The latter is wanting in one family.

Rodents have been divided in various ways by different authors. Jerdon separates his into four groups, viz. "*Sciuridæ*, squirrels; *Muridæ*, rats; *Hystricidæ*, porcupines; and *Leporidæ*, hares; which indeed are considered by some to embrace the whole of the order; to which has recently been added the *Saccomyidæ*, or pouched rats, whilst many systematists make separate families of the dormice, *Myoxidæ*; jerboas, *Dipodidæ*; voles, *Arvidolidæ*; mole-rats, *Aspalacidæ* and *Bathyergidæ*; all included in the MURIDÆ; and the *Caviadæ*, *Octodontidæ*, and *Hydrochœridæ*, belonging to the HYSTRICIDÆ" ('Mammals of India,' p. 164).

However, the system that most commends itself is that of Mr. E. R. Alston, proposed in the 'Proceedings' of the Zoological Society, and founded on the original scheme of Professor Gervais, by which the order is subdivided into two on the character of the incisor teeth. Those which have never more than two incisors, coated only in front with enamel are termed SIMPLICIDENTATA, or *Simple-toothed Rodents*. The other sub-order, the genera of which have rudimentary incisors, as in the case of hares, rabbits, &c., and in which the enamel is spread more or less over all the surface, is termed DUPLICIDENTATA or *Double-toothed Rodents*, and this is the system I propose to follow.