Habits. The habits of tigers and lions are for the most part similar, except that the tiger inhabits more wooded countries. Both animals are mainly nocturnal in their movements, sleeping in the daytime and wandering greatly in search of food at night. Both are excessively powerful, and able to kill large animals, such as full-grown cattle, horses, or even camels for food, and both occasionally kill men, and are greatly feared by the inhabitants of the country. Round animals of so ferocious a nature a series of myths have naturally collected, and it is difficult to unravel the true from the false in such traditions. It is not surprising that even intelligent sportsmen, finding that particular classes of natives have a singularly accurate knowledge of the haunts and habits of wild animals, should not always be able clearly to distinguish which of these habits have actually been observed, and which are merely traditional, both being equally believed in by the narrators.

Lions are perhaps bolder than tigers, and certainly much more noisy, their habit of roaring, especially in the evening and at night, having necessarily attracted the attention of all who have been in countries infested by them. Of the two the tiger, though standing lower, is heavier in the body, and I think the more powerful animal.

In India lions feed chiefly on deer, antelopes, wild pigs, cattle, horses, donkeys, and camels, and used formerly to kill many of the latter. Whether lions usually kill their prey, as tigers do, by breaking the neck, I cannot say; in the only cow I ever saw that had been killed by a lion (in Northern Abyssinia) the vertebræ were not dislocated. I also saw a lioness hold a camel by the throat for some minutes, without attempting to break its neck.

Lions are more easily tamed than most of the felines. They often breed in confinement*. The period of gestation is about 108 days, and from three to six young (in India it is said two to three) are commonly born in one litter. The eyes are open at birth. Young lions want the mane, which becomes gradually developed after the full growth is attained.

29. Felis tigris. *The Tiger.*

Felis tigris, *L. Syst. Nat.*, p. 61 (1766); *Blyth, Cat.* p. 54; *Jerdon, Mam.* p. 92; *D. G. Elliot, Mon. Fel.* pl. iii.

Bágh, Sher (female *Bághni, Sherni*), H.; *Náhar, Sela-vágh*, H. of Central India; *Babr*, P.; *Mazar*, Baluchi; *Shinh*, Sindhi; *Padar suh*, Kashmiri; *Patayat-bágh, Wahúg*, Mahr.; *Go-vágh*, Beng.; *Tut, Sad*, Hill tribes of Rájmehál; *Garúmkúla*, Kol.; *Lákhra*, Uraon; *Krodi*, Kondh; *Kula*, Sonthal, Ho and Korku; *Púli*, Tam., Tel., Mal., and Gond; *Púli-redda-púli, Peram-pilli*, Tam.; *Pedda-púli*, Tel.; *Perain-púli, Kúdua*, Mal.; *Kuli*, Can.; *Nári*, Kurg; *Pirri, Bürsh*, Toda; *Tág*, Tibetan; *Túkt* or *Tük*, Bhot.; *Sathong*, Lepcha; *Keh-va*, Limbú; *Schi*, Aka; *Matsá*, Garo; *Kla*, Khasi; *Sa, Ragdi, Tekhu, Khudi*, Naga; *Humpi*, Kúki; *Sunyo*, Abor.; *Sü*, Khamti; *Sirong*, Singpho; *Kei*, Manipuri; *Misi*, Kachari; *Kya*, Burmese; *Kla*, Talain; *Khi, Botha-o, Tupuli*, Karen; *Htso*, Shan; *Rimau, Harimau*, Malay.

* For an excellent account of the lions bred in the Dublin Zoological Gardens, see V. Ball, Trans. Roy. Irish Academy, xxviii, p. 723.

Pupil round*. Hair of the cheeks from behind the ears round the sides of the neck considerably lengthened in adult males, so as to form a ruff. Hair of body short and close (but varying in length somewhat with the season). Tail about half the length of the head and body, tapering gradually, not tufted at the end. Tail vertebræ 22 to 26.

The skull is very massive and heavy, the zygomatic arches excessively wide and strong, and the crests for attachment of the muscles highly developed. On an average the skull is even larger, wider, and more massive than that of the lion. The facial surface is considerably more convex, the maxillary bones terminate posteriorly between the orbits in front of the nasals, and the lower surface of the presphenoid in the roof of the posterior nares is much broader than in the lion, and is generally raised into a ridge along the middle. The lower surface of the mandible is nearly straight to near the angle, then slightly concave. Consequently the skull of a tiger, with the lower jaw attached, rests firmly on a flat surface, whilst the posterior portion of the skull nowhere touches the surface. This is not the case with any other great feline, except perhaps the jaguar.

Colour. Ground-colour, above and on the sides, varying from pale rufous to brownish yellow, below white, striped transversely with black throughout the head and body. The tail is marked with black rings. Ears black outside, with a large white spot on each. The ground-colour is much more rufous in some animals than in others, and forest tigers are probably darker and redder than those inhabiting the thin jungles of Central and Southern India. Young animals, too, are more brightly coloured than old. The young are born striped. Both black and albino tigers have been met with, though both are very rare. Mr. C. T. Buckland tells me that he once saw a black tiger that had been shot near Chittagong; whilst an albino tiger was exhibited in London, at Exeter Change, early in the century, and figured by Griffith†.

Dimensions. Adult males measure 5½ to 6½ feet from nose to insertion of tail, the tail being about 3 feet long. In a male 9 feet 4 inches long, measured by Tickell, the head was 16 inches, neck 12, body 4 feet, tail 3 feet 2 inches. Females measure about 5 to 5½ feet from nose to rump. The height at the shoulder is about 3 feet to 3 feet 6 inches. The usual measurement of tigers by sportsmen is from the nose over the curves of the head and back and along the tail to the tip. Thus measured full-grown tigers are generally 9 to 10 feet long, tigresses 8 to 9; but tigers have been killed 12 feet in length, and I myself shot an apparently full-grown tigress only 7 feet 6 inches long, and another specimen that had cubs with her measured only 7 feet 8 inches‡. The skull

* Jerdon is in error in stating that the pupil is vertical.

† Griffith's 'Cuvier,' ii, p. 444.

‡ A very good account of the measurements of tigers is given in Sterndale's 'Mammalia of India,' pp. 162, 527. See also Sir J. Fayrer, 'Nature,' June 27th, 1878, xviii, p. 219. By both tigers measuring over 12 feet are recorded. Tickell, in his MS. notes, states that he once saw a tiger that measured 11 feet 9 inches.

of a male tiger 9 feet 7 inches long measured 13 inches in extreme length, 12 in basal length, and 9 in breadth across the zygomatic arches; that of a large Nepal tigress 10 inches in extreme length by 7·8 in zygomatic breadth. But an enormous skull from Purneah measures according to Sterndale 15·25 by 10·5. Sanderson found a bulky, well-fed male tiger to weigh 25 stone (350 lbs.), and Elliot gives the weight of two large male tigers as 360 and 380 lbs., and of a large tigress 240 lbs. Forsyth gives much higher weights, but it is not clear whether he actually weighed the animals.

Distribution. Throughout India, Burma, and other parts of South-eastern Asia, Java, and Sumatra, but not Ceylon, nor, it is said, Borneo. The tiger occurs in suitable localities throughout a great part of Central Asia, and is found in the Valley of the Amur, the Altai Mountains, around Lob Nor in Eastern Turkestan, about the Sea of Aral, on the Murghâb near Herat, on the southern coast of the Caspian (Hyrcania), and in the Caucasus, but not in Tibet, Afghanistan, Baluchistan, or Persia south of the Elburz Mountains on the Caspian.

In India tigers still occur wherever large tracts of forest or grass-jungle exist; but within the last 20 or 30 years the number of these destructive animals has been greatly reduced, and they have now become scarce, or have even in some cases disappeared entirely in parts of the country where they formerly were common. This has been the case especially throughout a large area of the Central Provinces, in many parts of Bengal, and several districts of the Bombay Presidency. In the forests at the base of the Himalayas tigers are common, and they ascend the hills occasionally to an elevation of 6000 or 7000 feet, but none are found in the interior of the mountains. The species is entirely wanting throughout Baluchistan, Afghanistan, and the other countries due west of India, and is only found in a few places in Upper Sind and the western Punjab. It is wanting in Lower Sind and Cutch. To the eastward, in Assam and Burma, tigers are generally distributed.

The absence of tigers in Ceylon would seem to indicate that this animal has only recently migrated into Southern India, more recently than most of the other mammals, the majority of which are found on both sides of Palk Straits.

Habits. For a full account of the habits of tigers, on which more has been written than probably on any other wild animal, reference may be made to numerous works by Indian sportsmen. Foremost amongst these are Sir J. Fayrer's 'The Royal Tiger of Bengal,' Sterndale's 'Seonee' and 'Natural History of Indian Mammalia,' Forsyth's admirable 'Highlands of Central India,' Sanderson's equally accurate 'Thirteen Years among the Wild Beasts of India,' and McMaster's 'Notes on Jerdon's Mammals of India.' The first gives an account of the tiger in the grass-jungles and swamps of the Ganges valley, the second and third describe the animal haunting the forests of the Central Provinces, the fourth writer's experience was mainly gained in Mysore, and that of the fifth in the hills of Southern India.

Tigers are monogamous. The period of gestation is about 14 to 15 weeks, and from 2 to 5 young, and occasionally it is said even 6, are produced at one time. I have on more than one occasion known four cubs to be cut out from a tigress's body after death. There is no particular season for breeding. Young cubs are found at all times of the year. The tigress is said to avoid the male when about to bring forth, and to hide her young from him; but tigers are occasionally, though not often, seen accompanying tigresses and cubs. The young remain with the mother until nearly or quite full-grown; and when more than two tigers are found consorting together, the party consists in general of a tigress and her full-grown offspring, the old tiger occasionally associating with his family also. Forsyth observes that a tigress cannot have young more frequently than once in three years, because the cubs take about that time to attain their full growth.

These animals are usually found solitary or in pairs, less frequently in parties of from three to six. They remain at rest during the day, and roam about at night in search of food. Their wanderings are considerable, and frequently extend to many miles in the course of the night, a preference being given to well-beaten tracks or sandy beds of streams. On these, in the early morning, every incident of the night's adventures may be traced by an experienced tracker. The tiger sometimes continues his stroll in the early morning, and his movements, as Forsyth remarks, "may often be traced up to eight or nine o'clock by the voices of monkeys and peafowl, the chatter of crows and small birds, and the bark of sámbar and spotted deer." The alarm-cries of all these animals are quite peculiar and different from their ordinary calls; but it must be remembered that the cause of their alarm may be a leopard, a wild cat, a bear, a dog, or even in some cases a man, and not necessarily a tiger.

The tiger usually takes up his abode for the day in deep shade, especially in the hot season, and in general near water under a dense bush or tree, in high green grass, or in thick low cover such as green rushes, tamarisk, or some of the other plants that grow in the beds of streams. Not unfrequently a high bank affords him the cool shade he loves, and in rocky parts of the country caves are frequently resorted to; where ruins exist in jungle they are often a favourite abode. A well-known habit of all wild animals, but especially remarked in the case of the tiger, is the regularity with which particular haunts are selected in preference to others that appear equally well suited. Some one patch of high nul grass near the river-bank or on the edge of the swamp, one dense thicket of *jhow* (*Tamarix*) or *jáman* (*Eugenia*) amongst a dozen apparently similar in a stream-bed, one especial pile of rocks amongst hundreds along the hill-side, will be the resort year after year of a tiger, and when the occupant is shot, another, after a brief interval, takes his place.

Tigers, especially in the cold and wet seasons, when there is abundance of cover and water, are great wanderers, roaming from

place to place, though probably keeping in general within an area of 15 or 20 miles in diameter. In the hot season from March to June their range is usually more restricted, as vegetation is dried up or burnt except near the few spots where water is still found.

As has already been remarked, tigers are very much less in the habit of roaring than lions are. Where the latter are common scarcely an evening passes without their being repeatedly heard. I have often been in places where tigers were equally abundant, but it is an exception for their roaring to attract attention *. Their usual call is very similar to that of the lion, a prolonged moaning, thrilling sound, repeated twice or thrice, becoming louder and quicker, and ending with three or four repetitions of the last portion of it. Besides this, there is a peculiar loud "woof" produced when the animal is disturbed or surprised, a growl that it utters when provoked, and the well-known guttural sound of rage repeated two or three times when it charges. When hit by a bullet a tiger generally roars, but tigresses, at all events, very often do not; I have on three occasions at least known a tigress receive a mortal wound and pass on without making a sound.

Tigers swim well and take readily to water, even crossing arms of the sea. They but rarely ascend trees, and appear quite incapable of climbing a vertical stem, large or small. It is true that they have been known to take men out of trees, from heights it is said of even 18 or 20 feet; but such cases are always due to some peculiarity in the tree, a sloping trunk, or a fork 8 or 10 feet from the ground, from which the animal can get a fresh start. As a rule a tiger, like other mammals, pays no attention to men in a tree even a very few feet from the ground, if they do not move or speak.

In fact tigers are much less addicted to springing than is popularly supposed, and rarely move their hind legs off the ground except to clear an obstacle. Still they are capable of springing some distance. They have a habit, like cats, of scratching wood, and often show a predilection for the trunk of a particular tree, on which the marks of their claws may be seen up to a height of 10 or, it is said, 12 feet.

The ordinary game-eating tiger of the forest lives mainly on deer and pigs, and avoids the neighbourhood of human habitations. Almost all tigers, however, occasionally kill cattle. The wild animals commonly eaten by tigers are pigs, deer of all kinds, nylgai, four-horned antelope, and porcupines. The last are evidently a common prey. I have repeatedly, in the Central Provinces, when skinning tigers, found fragments of porcupine-quill encysted beneath the skin. Peafowl may be slain at times, but more often, I think, by leopards than by tigers, and the same may be said of monkeys. Bears, though not often attacked, occasionally fall

* It is true that my own experience was at not quite the same time of the year. I have been repeatedly in jungles inhabited by tigers from November till June, and only in lion-haunted tracts in July and August. But all travellers notice the noisiness of lions.

victims. I have more than once seen unmistakable remains of a bear that had been devoured; and Sanderson relates an instance of a tiger that was said to have taken habitually to the slaughter of bears for food. Young gaur are occasionally killed, but the full-grown animal is more than a match for most tigers. Instances are said to have been known of even young elephants being attacked, one such is mentioned by McMaster. In fact a hungry tiger will probably kill any other animal he can for food. He is said to have been observed catching and eating frogs; and Mr. Simson found tigers in Eastern Bengal, during inundations, feeding upon fish, tortoises, crocodiles, and large lizards, and he once killed a tiger the pouch of which was crammed with grasshoppers or locusts. It is not to be supposed that the tiger's prey is killed without a struggle, and the more powerful animals sometimes beat off their assailants, whilst instances have been recorded in which large boars have killed tigers that attacked them, the two having in some cases been found dead together.

Great numbers of domestic animals are killed by tigers annually, and many of the latter appear to live entirely upon cattle. Oxen are the ordinary prey of the cattle-eating tiger, who is often an older animal than the game-killer, having become by long experience more cunning and less afraid of man. Tigresses with cubs also often quarter themselves upon a village and subsist in luxury on the flocks and herds of the villagers. Sheep and goats are not so often attacked, tigers having a distinct preference for beef, but ponies, and even horses and camels, are occasionally killed. Buffaloes in a herd are fully able to defend themselves, and generally attack a tiger, many incidents being recorded in which they have rescued their herdsman; but tigers often kill young buffaloes if they are found away from the herd.

There has been much discussion as to the manner in which the tiger kills its prey. The popular notion was, and probably still is, that the tiger springs upon its victim from a distance, and either kills the animal by one blow of its paw, or tears the throat with its teeth and sucks the blood. All this is certainly incorrect, so far, at all events, as cattle are concerned; small animals may perhaps be killed by a blow of the paw. I have seen many oxen that had been killed by tigers, and in numerous cases (always, I think, when I ascertained the point) the neck had been broken, whilst in several instances, despite the marks of fangs upon the throat, the great blood-vessels of the neck were untouched, and claw-marks were confined to scratches on the forequarters. All these details agree with the description given by Sanderson from the accounts received from herdsmen. According to these, the tiger does not spring upon his prey: "clutching the bullock's forequarters 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 before the herdsman

can turn round." It is probable that with smaller animals the tiger does not always take the trouble to break the neck, and in the case of large beasts such as buffaloes and gaur, which he is unable to overthrow, he occasionally hamstrings them, I think by a blow with his claws, but am not sure. I have twice known instances in which buffaloes were left hamstrung by tigers. Tigers sometimes undoubtedly kill or disable by the fearful blows they can give with their paws, but the above is, I believe, their usual plan of killing oxen.

Sterndale confirms Sanderson's account, and also points out that a tiger very rarely springs upon his prey; he probably takes advantage of the momentary paralysis produced by his appearance to make a short rush and to seize the animal he intends to devour. He generally stalks as near as he can, but he has been seen to gallop after animals for some distance before seizing one of them.

I quite agree with Sanderson, who regards "the venerable belief in tigers sucking the blood of their victims" as one of the numerous myths that have collected around beasts of prey in the course of ages.

If an animal is struck down in the daytime, the body may be dragged some distance, but is usually left untouched till evening. At or soon after nightfall, or occasionally in quiet places before sundown, the tiger returns to the kill (known as *ghara* or *mara*), and, if the spot is open or otherwise unsuited for his repast, drags the body to a more convenient place. The enormous muscular power of the tiger is shown by the way in which he can transport large carcases of oxen or buffaloes over rough ground, up and down steep banks and through thick bushes. He sometimes lifts the body completely off the ground; Sanderson mentions an instance in which a bullock, weighing about 400 lbs., was thus carried for 300 yards. He almost always commences by eating the intestines and hindquarters. As a rule he remains near the kill, sometimes rushing out upon any intruder and driving away jackals, vultures, and other carrion-feeders; but more often he hides the carcase under bushes or leaves, and retires to a neighbouring thicket beside water. If very hungry, a tiger will devour both hindquarters the first night. If undisturbed, he generally remains about three days near the carcase, feeding at intervals. In one case, so far as I could learn, a large ox was completely devoured in 48 hours, only a few fragments of bones and the contents of the stomach being left. Forsyth says that a tiger which lives entirely on cattle kills an ox about once in five days, and passes about two days after finishing his last victim without looking about for food, though he will strike down another quarry if it comes near him. Young tigers are more destructive than older animals, and when one gets amongst a herd of cattle, he frequently kills several, apparently in pure wantonness. A tigress with cubs, too, is frequently very destructive, partly, it is said, in order to teach the young tigers to kill their own prey. An animal that has been fired at, especially if he has been wounded, when returning to the kill, will frequently never again return to the body of his prey, but kill afresh when hungry.

It is well known that, although tigers as a rule kill their own food, they do not disdain carrion; in numerous instances they have been known to eat animals killed by sportsmen and even bullocks that had died of disease. Cases are even on record in which a tiger that had been shot has been devoured by another of his own species.

The ordinary game- or cattle-eating tiger is the greatest of cowards in the presence of man, and often allows himself to be pelted off from the animal he has seized. Sterndale mentions a case in which a herdsman laid his heavy iron-bound staff with impunity across the back of a tiger who had seized one of his cows; and I once found two young children, the eldest not more than 8 or 9 years old, left in jungle to drive a tiger away from the body of a bullock he had killed, and to prevent his eating it or dragging it away. The half-wild inhabitants of the Indian forests have but little fear of ordinary tigers; and after some 20 years' wanderings in large part through tracts infested with tigers, I agree with Forsyth that, except in the haunts of a man-eater, there is little danger in traversing any part of the jungles. Bears are, I think, more to be feared than tigers. The only tigers not being man-eaters that are dangerous are tigresses with young cubs, and occasionally a hungry tiger who has just killed his prey. Of course this only refers to unwounded tigers; a tiger that has been wounded will usually attack any one who approaches him, but even he will not charge home against a body of men, and one successful method of shooting tigers and following them when wounded is founded on this circumstance.

The man-eater is, to quote Forsyth, "a tiger who has got very fat and heavy, or very old, or who has been disabled by a wound, or a tigress who has had to bring up young cubs where other game is scarce. All these take naturally to man, who is the easiest animal of all to kill, as soon as failure with other prey brings on the pangs of hunger." A tiger that has once taken to man-eating will probably, having got over his innate fear of the human species, continue to live upon the same prey, though it is the exception for even man-eaters to confine themselves to human food. Still a few do so to a great extent, and a fearful scourge such a tiger becomes. The destruction of human life by tigers is still considerable in India, and the whole takes place in comparatively thinly peopled portions of the country. Thus in Lower Bengal alone in six years 1860–66, 4218 persons were killed by these animals. In all probability nearly the whole destruction was caused by a very small percentage of the tigers inhabiting the country.

Forsyth says that great grazing districts, into which cattle come for a limited season only, are always the worst for producing man-eating tigers. There is much reason for believing that a tigress, who has taken to preying upon man, brings up her cubs to the same mode of life. A man-eater generally becomes cunning and suspicious beyond all ordinary tigers, and around this, the most terrible of all wild animals, myths and legends centre until it is difficult to know what is true and what is false. Many of the

wolf-legends of Europe may be found repeated and intensified in connection with the Indian tiger. Foremost among these tales is of course the wehr-wolf superstition—a belief that certain men have the magical power to transmute themselves at will into wild beasts. But the most remarkable of all is the creed, universal in the Central Provinces and generally prevalent, I believe, throughout India, that the spirits of those men who have been killed by a tiger attend him and sit upon his head, and that they not only warn him against danger, but, entertaining malice against their fellow-men, aid him to destroy them. This superstition exists amongst many races.

Tigers or representations of tigers are actual objects of adoration, or, to speak more correctly, propitiation, amongst some of the wilder tribes of the Indian Peninsula; and one form of oath in Courts of Justice is, or was formerly, administered on a tiger's skin. Various parts of the animal, such as the front teeth, the claws, the whiskers, and the rudimentary clavicles (*birnukh*), are preserved as amulets and charms. The whiskers, Jerdon says, in some parts of Southern India are considered to endow the fortunate possessor with unlimited power over the opposite sex. In other parts they are regarded as a deadly poison, and are destroyed as soon as a tiger is killed.

To one peculiar and wide-spread myth, the relations between tigers or lions and jackals, some reference will be found under the head of the latter.

The destruction of so dangerous an animal as the tiger is naturally one of the principal objects both of the native shikári, who kills for the reward given by Government, and varying from Rs. 5 to Rs. 50 in different districts, and of the European sportsman. The common native plan, adopted occasionally by Europeans, is to build a platform, or *machán*, in a tree, either close to the carcase of an animal that has been killed by a tiger, or to a spot where a live animal, usually a bullock or young buffalo, is tied up as a bait, and to shoot the tiger when he comes to feed on the carcase or to seize the bullock. Another system, adopted by Europeans from Indian chiefs, is to drive the jungles with a line of elephants, the sportsmen shooting from howdahs. This is often almost the only practicable plan in the great plains of Bengal and Upper India, which are covered with grass from 8 to 20 feet high.

In the smaller jungle-patches of Central and Southern India, tiger-shooting is chiefly attempted in the hot season, and the tiger is either driven by beaters past a tree on which the sportsman sits, or followed up, either on an elephant or on foot. Baits, usually young buffaloes, are tied out in selected spots, in order to induce the tiger to kill, and remain during the heat of the day in places convenient for finding him; and native trackers, many of whom could probably vie with the far-famed American Indians themselves, are employed to follow up the animal and ascertain where it is lying. A full account of this method is given by Forsyth in the 'Highlands of Central India.' Occasionally, especially when a

tiger has been wounded, a herd of buffaloes are employed to drive him out of the cover, which they do very effectually, charging him in a body if he does not retreat.

In some parts of Southern India a plan is adopted of enclosing a small area of jungle, into which a tiger has been traced, by nets. The animal is then speared or shot when occasion offers. A full account of this method is given by Sanderson in the work already quoted. According to Jerdon, in the Wynaad tigers are driven into a net and speared by a particular class of natives.

It would be impossible to notice all the methods adopted for destroying tigers. In some parts of the country traps are used, but the cage-trap, though often successful in capturing panthers, is seldom so with tigers. Tigers are occasionally taken in pitfalls. A kind of figure-of-4 trap with a heavy platform loaded with stones, that falls upon the tiger and crushes him, is used in parts of Orissa and, I believe, elsewhere. In Burma a bow is set with a poisoned dart, and let off by a string across the path. Spring-guns have also been used. Poisoning the carcase of an animal killed by a tiger is also resorted to in some cases, strychnine being chiefly used for the purpose by Europeans, but it is not always effective.

The age to which tigers live is not clearly ascertained. Sanderson mentions an instance in which he killed a large cattle-eating tiger that had been known to haunt a particular group of villages for twenty years. This animal showed no signs of age except that his coat was becoming light-coloured.

Tigers captured young are easily tamed, and many of the adult animals in menageries are perfectly good-tempered, and fond of being noticed and caressed by those whom they know. They have repeatedly bred in confinement, though not so freely as lions, and the cubs more rarely survive.

30. **Felis pardus.** *The Leopard or Panther.*

Felis pardus, *L. Syst. Nat.* i, p. 61 (1766); *Blyth, Cat.* p. 55; *Jerdon, Mam.* p. 97; *Elliot, Mon. Fel.* pls. vi, vii.
Felis leopardus, *Schreb. Säugeth.* iii, p. 387, pl. ci; *Kelaart, Prod.* p. 45.

Tendwa, Chita, Sona-chita, Chita-bágh, Adnára, H.; *Palang,* Pers.; *Diho,* Baluch.; *Sáh,* Kashmiri; *Tidua, Srighas,* Bundelkand; *Gorbacha* or *Borbacha,* Deccan; *Karda, Asnea, Singhal, Bibia-bágh,* Mahr.; *Tenduwa, Bibla,* Bauris of Deccan; *Honiga, Kerkal,* Canarese; *Teon-Kula,* Kol.; *Jerkos,* Paharia of Rájmehál; *Barkál, Gordág,* Gond.; *Sonora,* Korku; *Chiru-thai,* Tam.; *Chinna-puli,* Tel.; *Puli,* Mal.; *Kutiya,* Cingalese; *Bai-hira, Tahir-hé, Goral-hé,* or *Ghor-hé,* hill-tribes near Simla (according to Jerdon, generally known as *Lakhar-bagha,* a name elsewhere used for the hyæna); *Sik,* Tibetan; *Syèk* or *Syiak,* or *Sejjiak,* Lepcha; *Kajengla,* Manipuri; *Misi patrai, Kam-kei,* Kuki; *Hurrea kon, Morrh, Rusa, Tekhu Khuia, Kekhi,* Naga; *Kya-lak* or *Kya-thit,* Burmese; *Kla-preung,* Talain; *Kiché-phong,* Karen; *Rimau-bintang,* Malay.

Pupil circular. Tail varying from rather more than half to about three quarters the length of the head and body. Caudal vertebræ usually 24 or 25, but varying, it is said, from 22 to 28.

The upper surface of the skull is arched, as in the tiger, but the lower jaw is convex beneath, as in the lion, the condyle being proportionally nearer the angle even than in the latter. When a leopard's skull, with the mandible attached, is placed on a flat surface, the hinder part of the skull almost always touches that surface.

Ground-colour above from rufous to yellowish white or pale brownish yellow, sometimes darker, sometimes paler; below white. The whole animal is spotted. The spots or rosettes on the back, sides, and dorsal portion of the tail are black externally, pale-coloured within; they vary much in number, size, and form; the surrounding black border of each spot is more or less interrupted, an unbroken ring being of rare occurrence, whilst the inner pale area is sometimes darker than the ground-colour outside, but usually the same. The spots on the head, distal portions of the limbs, and lower parts have no pale centres. Young leopards are of a brownish colour, and the spots are much less clearly defined.

Dimensions very variable, the total length of head, body, and tail together ranging from 5 to 8 feet. A large male measured:—Head and body 4 feet 9 inches, tail 3 feet 2 inches; total 7 feet 11 inches (*Jerdon*). A smaller animal 3 feet 10 inches and 2 feet 10 inches; total 6 feet 8 inches (*Tickell*). Height at shoulder about 2 feet. An average-sized skull measures 6·9 inches in basal length and 5 inches wide across the zygomata; but in the series of adult skulls in the British Museum the basal length varies from 5·6 inches to 8·1.

Distribution. Asia generally, with the exception of Siberia and the high Tibetan plateau. Found also throughout Africa. In India, Burma, and Ceylon this animal is generally distributed, except in parts of Sind and the Punjab. Fossil remains have been found in Great Britain, Spain, France, and Germany.

Varieties. By very many writers, and amongst Indian naturalists by Sykes, Elliot, Horsfield, Hodgson, and Sterndale, it has been thought that there are two species of Indian leopards—a larger and a smaller. Even Jerdon appears to have been in doubt on the subject. Most of the sportsmen who have hunted in Central India and many native shikáris distinguish these two forms, and in parts of the country there is some appearance of two races—a larger form that inhabits the hills and forests, and a smaller form, commonly occurring in patches of grass and bushes amongst cultivated fields and gardens. The larger form is said to have a shorter tail, a longer head with an occipital crest, and clearly defined spots on a paler ground-colour. The smaller form has a comparatively longer tail, a rounder head, less clearly defined spots, and rougher fur. I cannot help suspecting that the difference is very often due to age *, as in the case of the supposed two species of four-horned antelope, for younger leopards have rounder heads, without

* Tickell, I find, in his MS. notes makes the same suggestion.

any occipital ridge to the skull, and rougher fur than older animals. I have for years endeavoured to distinguish the two forms, but without success. The size of the animal, the number, form, and closeness of the spots, and length of tail are all extremely variable characters. The animals found in the damp forests of the Himalayas, Bengal, Assam, and Burma are darker and redder in colour, and have the spots larger in proportion to the interspaces, than the paler-coloured leopards of the Indian Peninsula; and I think some of the leopards of Central India are larger than is usual elsewhere. I cannot myself, as I have said, in many cases determine to which of the two supposed forms an Indian leopard-skin should be referred, yet I can tell most African skins * at a glance, as the spots are very much smaller; and there is a race inhabiting Persia, and found in Baluchistan and the mountains of Sind †, that differs widely from all the others and is quite intermediate in coloration and spotting between the leopard and the ounce, the resemblance to the latter being increased by the long fur and thick hairy tail. These two varieties, the African and the Persian, however, pass by insensible gradations into the ordinary form; and I cannot find any difference in the skulls or evidence to satisfy me that there is any constant distinction between different races of leopards, pards, or panthers. This is the conclusion at which Mr. Blyth also arrived.

A black variety of the leopard is not uncommon. The spots on this can still be traced if the skin is viewed in certain lights, but the general colour is uniform black, the colour of a black cat. This form, though distinguished by some writers as *Felis melas*, is unquestionably only a variety, the occurrence of black and spotted cubs in the same litter having been repeatedly recorded. Black leopards are more common on the hills of Southern India and in Travancore than in other parts of the peninsula; they are also said to be of frequent occurrence in the Malay Peninsula. A white (albino) leopard is figured in Buchanan Hamilton's drawings.

Habits. The habits of leopards differ materially from those of tigers. The leopard is much more lithe and active even than the tiger, climbing trees readily, and making immense bounds clear off the ground. The leopard is often found in the neighbourhood of villages, hiding during the day amongst the crops or in the bushes about cultivation, and carrying off sheep, goats, and especially dogs, at night. In pursuit of his prey he seems to have but little fear of man; he will enter outhouses, native huts, or even tents. He cares but little for the neighbourhood of water even in the hot weather, his favourite haunts being rocky hills covered with thick scrub, and he is generally found in caves and under piles of rocks.

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* Probably the true *F. leopardus* of Erxleben &c. and *F. pardus* of Temminck.

† Probably *F. tulliana*, Val. See Alston and Danford, P. Z. S. 1880, p. 51. I have a fine skin, for which I am indebted to Mr. H. E. Watson, from the Khirthar range on the western frontier of Sind.

He can conceal himself in the most wonderful way, his spotted hide blending with the ground, and his lithe loose form being compressible into an inconceivably small space. I quite agree with Forsyth, from whom I have taken several of the above traits, that he is more courageous than the tiger; if brought to bay, the leopard will charge again and again with the utmost ferocity.

Large leopards, or panthers as Jerdon calls them, often kill cattle, ponies, donkeys, and large deer such as sámbar, but the smaller varieties have to content themselves with inferior prey. The leopard, however, is absolutely without prejudice in the matter of food—all beasts, birds, and, I believe, reptiles that are not too large to kill or too small to catch are the same to him; he will strike down an ox or bound upon a sparrow. If he has a predilection, it is probably for dogs and jackals. He is a terrible foe to monkeys, and kills many of the hanúmáns or langúrs who inhabit the rocky hills in which he delights. Leopards, like tigers, sometimes kill their prey by breaking the neck; but I am disposed to believe that they frequently either tear open the throat or hold it in their jaws and strangle their victim. However, I have not had many opportunities of seeing animals killed by them. They carry away the body like tigers, and hide what they do not eat, very often in a tree.

Leopards occasionally take to man-eating and, owing to their boldness, become even a more fearful scourge than tigers. In two parts of India, the Sonthál Pergunnahs south of Bhágalpur, and Seoni in the Central Provinces, at about the same time (1857–60), leopards were singularly destructive to human life, taking men, women, and children by night out of houses, or off the machán or platforms built in the fields to watch the crops from. One leopard near Seoni, commemorated by Sterndale and Forsyth, is said to have killed 200 human beings in two years before he was shot.

The idea that leopards object to cross water, though supported by an observation of Blyth's that a tame animal showed great aversion to wetting his feet, is erroneous. Like other wild animals, they swim well.

The leopard, as a rule, is a very silent animal, rarely, except when provoked, uttering a sound. When surprised and when charging, he makes noises similar to those made by a tiger; but his call is very different. I have occasionally heard a sound which agrees with the description I have received both in Africa and in India of this animal's cry, and which corresponds to the account of it given by Captain Baldwin in the 'Large Game of Bengal.' It consists of a peculiar harsh noise between a grunt and a cough, repeated quickly three or four times. Forsyth calls it a harsh grating roar.

The period of gestation does not appear to have been accurately recorded, but is said to be about the same as in the tiger and lion, or fifteen weeks. The young are born about February or March in the Peninsula of India, and a litter usually consists of two, three, or four cubs. They probably take about the same

time as a tiger, three years, to arrive at full growth. Young leopards are more difficult to tame than tigers or lions; and, even when tamed, are less to be trusted. On the whole, this feline has an exceedingly bad character.

Leopards are killed in large numbers by native shikáris, but, despite the greater prevalence of the species, fewer leopards than tigers are shot by European sportsmen. This is due to the difficulty of finding leopards, owing to the manner in which they conceal themselves and to their independence of water, and also to the extremely difficult aim they afford to a rifle, on account of the swiftness of their movements and their power of hiding themselves. The ordinary Indian plan of shooting them is to tether a kid or calf, or occasionally a dog, near the tree in which the hunter sits, and to make the bait bleat from time to time by pulling a string. A favourite device with native shikáris is to put a fish-hook through the unfortunate bait's ear and attach a string thereto. A light from an earthen pot (garra) is sometimes thrown on the tethered animal, or the ground around is sprinkled with chaff or flour to render the leopard more conspicuous at night.

Owing to his greater boldness, a leopard is much more easily trapped than a tiger, and many are taken alive in a kind of cage baited with a live calf, goat, or dog. The bait is usually placed in a separate partition, so arranged as to open and release the bait by the shutting of the door which entraps the leopard. Fall-traps and spring-bows or guns are also used to kill panthers as well as tigers.

31. **Felis uncia.** *The Ounce or snow Leopard.*

Felis uncia, *Schreber, Säugeth.* iii, p. 586, pl. c (1778); *Blyth, Cat.* p. 58; *Jerdon, Mam.* p. 101; *Elliot, Mon. Fel.* pl. iv.
Felis irbis, *Ehrenberg, Ann. Sc. Nat.* xxi, p. 410 (1830).

Ikar, Zig, Sachak, Sáh, Tibetan (Bhotia); *Bharal he* of hills north of Simla; *Thurwágh,* Kunawar.

Fur long, dense, and rather woolly. Tail thick, scarcely tapering, about three quarters the length of the head and body.

The skull differs greatly from that of a leopard, being much higher and more convex when viewed from the side, with a depression at the posterior termination of the nasal bones, which are broad and short; the postorbital processes, too, are less bent down. The face in front of the orbits is very short.

Colour. Ground-colour above very pale whitish grey, sometimes with a yellowish tinge, below white; the whole animal spotted with black. The spots on the back, sides, and tail are large, black, interrupted rings or rosettes of rather irregular shape, much larger than in leopards, the space inside each ring being usually rather darker than the ground-colour; spots on the head, limbs, and terminal portion of the tail without pale centres; the spots on the belly few in number and rather indistinct. From near the middle

of the back to the root of the tail is a median dark band. Ears black, each with a large yellowish spot.

Dimensions. Head and body about 4 feet 4 inches, tail 3 feet, height 2 feet. A skull measures about 6 inches in basal length, and 4·75 in zygomatic breadth.

Distribution. High Central Asia, especially Tibet, extending north to the Altai, and west, it is said, into Persia. This, however, and the reported range still further to the westward into Armenia, is somewhat doubtful; the peculiar pale-coloured variety of leopard found in Western Asia (*F. tulliana*) may have been mistaken for an ounce (see Alston, P. Z. S. 1880, p. 51). The ounce is found throughout the Himalayas at high elevations, and is more abundant on the Tibetan side of the Snowy Range, where it is met with in the Upper Indus and Sutlej valleys. It is fairly common in Gilgit. It is known to sportsmen as the snow leopard.

Habits. Not much is known of the ounce's life-history. It lives amongst rocks at considerable elevations, never, it is said, below 9000 feet above the sea in the Himalayas. This, however, may be in summer; for Scully relates that in Gilgit the ounce descends as low as 6000 feet in winter. It preys upon wild sheep and goats (ibex, markhor, and thár), and probably upon any rodents (marmots, hares, *Lagomys*, &c.) or birds it can capture; it carries off sheep, goats, and dogs from villages, and even kills ponies, but, it is said, has never been known to attack man.

32. Felis nebulosa. *The clouded Leopard.*

Felis nebulosa, *Griffith, Carnivora*, p. 37, plate (1821).
Felis diardi, *Cuv. Oss. Foss.* ed. nouv. (2e) iv, p. 437 (1823); *Blyth, P. Z. S.* 1863, p. 183; *Jerdon, Mam.* p. 102; *Elliot, Mon. Fel.* pl. viii.
Felis macrocelis, *Temminck, Horsf. Zool. Journ.* i, p. 543 (1825); *Tickell, J. A. S. B.* xii, p. 814; *Blyth, Mam. Birds Burma*, p. 27.
Felis macroceloides, *Hodgs. Calc. Journ. N. H.* iv, p. 286 (1844) (no description); *id. P. Z. S.* 1863, p. 192, pl. xxxviii; *Blyth, Cat.* p. 58.

Pungmar, Satchuk, Lepcha; *Zik*, Limbu; *Kung*, Bhotia; *Lamchitia*, Khas tribe, Nepal; *Thit-Kyaung*, Burmese; *Arimau dahan* (tree tiger), Malay; *Clouded Tiger* of British naturalists.

Size of a small leopard. Pupil oval, vertical. Tail thickly furred, nearly the same thickness throughout, and long, about four fifths the length of the head and body. Caudal vertebræ 25.

Skull long, low, and narrow. Orbit widely open behind. Hinder termination of bony palate concave; mesopterygoid fossa narrow. Lower edge of mandible straight from symphysis to near the angle, then concave. The upper canines are longer relatively than in any other living cat, and have a very sharp edge posteriorly. Anterior upper premolar frequently but not always wanting.

Colour. General tint varying from greyish or earthy brown (cat-grey) to fulvous (light yellowish brown); lower parts and

inner side of limbs white or pale tawny. Head spotted above; two broad black bands, with narrower bands or elongate spots between them, commence between the ears, run back to the shoulders, and are prolonged, more or less regularly, as bands of large oval or elongate marks along the back. Sides of body usually divided into large subovate, trapezoidal, or irregularly shaped darker patches

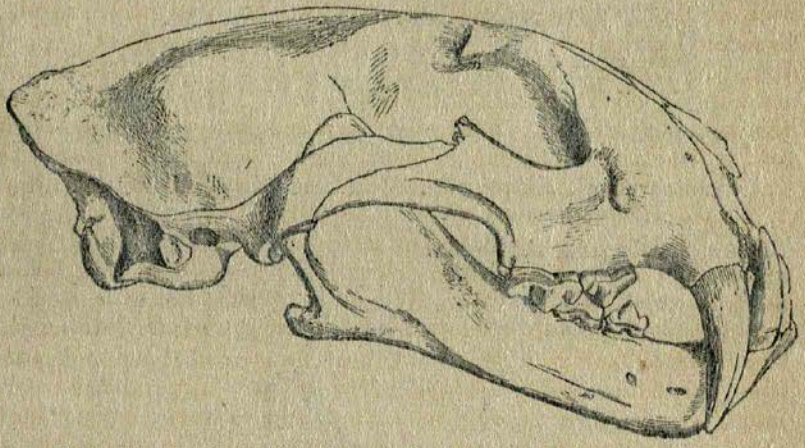

Fig. 17.—Skull of *Felis nebulosa*. (Gray, P. Z. S. 1867, p. 266.)

by narrow pale bands, the patches in places edged with black, especially behind. In old specimens the dark patches are sometimes indistinguishable, but the black edges remain as irregular stripes. The limbs and underparts are marked with large black spots. Tail with numerous dusky rings, often interrupted at the sides, those near the body traversed above by a longitudinal band. Ears black externally, often with a grey spot in the middle. Two black horizontal cheek-stripes, the upper running from the eye; the margin of the upper lip also black laterally in some specimens. There is an irregular black band across the chin and another on the throat. Blyth states that this animal grows more fulvous with age, the greyer skins being those of young animals.

Dimensions. An old male, measured by Hodgson, was 37½ inches long from snout to vent; tail with hair at end 30, without 29; height 14½, length of ear 2⅜; weight 44½ lbs. In another specimen the head and body measured 3½ feet, tail 3. A skull larger than usual, from Assam, is 6·2 inches long from the foramen (basal length), and 4·75 broad across the zygomatic arches; another skull 4·7 by 3·6.

Distribution. The clouded leopard occurs in the South-eastern Himalayas, Sikhim, Bhutan, &c., at moderate elevations, probably not above 7000 feet. It is also found in the Assam hills and throughout the hilly parts of Burma, Siam, the Malay Peninsula, Sumatra, Java, and Borneo. A variety with a shorter tail (*Leopardus brachyurus*, Swinhoe) has been obtained in Formosa.

Habits. Very little is known of the habits of this animal, all that has been recorded hitherto about it in the wild state being derived from the accounts given by native hunters. It is believed to be thoroughly arboreal, living and sleeping in trees, and preying upon birds and mammals. In captivity it appears not difficult to tame.

33. Felis marmorata. *The marbled Cat.*

Felis marmorata, *Martin, P. Z. S.* 1836, p. 108; *Blyth, Cat.* p. 59; *id. P. Z. S.* 1863, p. 183; *Jerdon, Mam.* p. 104; *Elliot, Mon. Fel.* pl. ix.

Felis charltoni, *Gray, A. M. N. H.* xviii, p. 211 (1846); *Blyth, Cat.* p. 59.

Leopardus dosul, *Hodgs. Cat. Mam. &c. Nepal, B. M.* 2nd edit. 1863, p. 3 (no description).

Sikmar, Bhotia; *Dosal*, Lepcha.

Larger than a domestic cat. Tail bushy, nearly the same thickness throughout, about three quarters the length of the head and

Fig. 18.—*Felis marmorata.* (Elliot, Mon. Fel.)

body. Fur soft, thick, with woolly underfur (at all events in Himalayan skins). Ears short, rounded at the end. Bony orbit complete behind in old skulls. The posterior edge of the bony palate deeply concave. Anterior upper premolar apparently often wanting.

Colour. Ground-colour varying from brownish grey (earthy brown) to bright yellowish or rufous brown, lower parts paler. The sides divided by narrow pale streaks into large, irregularly shaped darker patches, black on the hinder edges. Along the back are angular black blotches or irregular rings, arranged more or less

in longitudinal bands. There are black spots on the outside of the limbs, the upper surface of the tail, and usually on the lower parts; but those on the belly are very variable, being sometimes large and distinct, sometimes almost imperceptible. The inside of the limbs and the chest are banded or spotted, and there are the usual cheek-stripes. Two interrupted bands, one from the inner corner of each eye over the head, are continued as well-marked black stripes on the hind neck, spots or bands intervening between them on the head but not on the neck. The underfur is rich brown. According to Blyth, the ground-colour becomes more fulvous with age.

Dimensions. Length of head and body 18½ to 23 inches, tail 14 to 15½, ears from crown of head 2 (*Jerdon*). The basal length of a skull is 2·95 inches, zygomatic breadth 2·6.

Distribution. The marbled cat is found in Sikhim and the Eastern Himalayas, and in the hilly regions of Assam, Burma, and the Malay countries, extending to Sumatra, Java, and, it is said, Borneo. This animal has not been recorded from Nepal.

Habits. Nothing known. *F. marmorata* is probably arboreal, like the similarly coloured *F. nebulosa*. In Sikhim it is said to be shy and fierce.

34. Felis temmincki. *The golden Cat.*

Felis temminckii, *Vigors & Horsf. Zool. Journ.* iii, p. 451 (1828); *Elliot, Mon. Fel.* pl. xvi.

Felis moormensis*, *Hodgs. Gleanings in Science*, iii, p. 177 (1831); *id. P. Z. S.* 1832, p. 10; *Elliot, P. Z. S.* 1871, p. 759.

Felis aurata, *Blyth, P. Z. S.* 1863, p. 185; *Jerdon, Mam.* p. 107 *Sclater, P. Z. S.* 1867, p. 816, pl. xxxvi, *nec Temm.*

Felis nigrescens, *Hodgs. Cat. Mam. &c. Nepal, B. M.* 2nd edit. p. 4 (no description).

Size rather less than that of *F. nebulosa*. Pupil very slightly elliptical in a strong light, round in general. Tail about two thirds the length of the head and body, almost the same thickness throughout. Caudal vertebræ 22. Ears short, rounded. Fur of moderate length, dense, rather harsh.

Skull with the orbits nearly complete behind. Lower surface of presphenoid very narrow and bordered by parallel lines.

Colour. Deep ferruginous or chestnut, darker (bay) along the back, paler on the sides, still paler and whitish below; chin and lower surface of tail to the tip white, the tip above is dusky. There are some round dusky spots on the breast, between and behind the axils, and, in some specimens, on the inside of the fore limbs, and less distinct markings, forming imperfect bands, on the throat. The lower side of the tarsi and feet are brown. The markings on the face are peculiar and somewhat variable; the most conspicuous is a horizontal white or buff cheek-stripe, sometimes edged with black, from below the eye to behind the gape; a whitish band

* The spelling was subsequently corrected to *murmensis* by Hodgson himself in several publications, *e. g.* Calc. Journ. Nat. Hist. iv, p. 286.

inside each eye; and occasionally curved lines running back from above the eye to between the ears. Ears black or brownish black outside, with an ill-defined pale central spot. Fur brown at the base, ferruginous near the end, some black tips on the back.

A variety of a dark brown colour also occurs (*F. nigrescens*, Hodgson), both in Nepal and Tibet. It has the same white under-surface to the tail.

Dimensions. A fine male, according to Hodgson, who saw the animal alive, measured, length of head and body 31·5 inches, tail 19, height at the shoulder 17, length of ear 2·5. An adult skull from Nepal, in the British Museum, measures 4·8 inches in basal length, and 3·65 in zygomatic width.

Distribution. The South-eastern Himalayas, at a moderate elevation; rare in Nepal, more abundant in Sikhim. Found also in Tenasserim, Sumatra, and Borneo, and probably throughout Burma and the Malay Peninsula. Mason mentions an animal known to the Burmese as the fire-cat or fire-tiger, from its red colour; and Theobald saw a specimen caged at Moulmain. A suggestion has recently been made in the 'Taprobanian,' i, p. 33, that this species may be found in Ceylon, but this is improbable.

Habits. Unknown. Several specimens have been obtained alive; there was one for some time in the Zoological Gardens, London, and another in Calcutta. This cat does not appear easily tamable.

35. Felis viverrina. *The fishing Cat.*

Felis viverrina, *Bennett, P. Z. S.* 1833, p. 68; *Blyth, P. Z. S.* 1863, p. 184; *Jerdon, Mam.* p. 113; *Blyth, Mam. Birds Burma*, p. 27; *Elliot, Mon. Fel.* pl. xxii.

Felis viverriceps, *Hodgs. J. A. S. B.* v, p. 233 (1836); *Kelaart, Prod.* p. 46.

Felis himalayanus, *Jardine, Nat. Lib., Felinæ*, p. 230, pl. 24* (1837).

Felis celidogaster, *Blyth, Cat.* p. 61, *nec Temm.*

Banbiral, Bárâun, Khupya-bágh, Bágh-dâsha, H.; *Mach-bágral*, Beng.; *Hándún-diva*, Cingalese.

Size larger than that of the domestic cat, limbs short and strong, head elongate, ears short and rounded. Fur coarse, without any gloss. Tail about one third the length of the head and body. Caudal vertebræ 19. Pupil circular.

Skull long, occipital and sagittal crests well-developed; muzzle narrow, compressed, elongate; nasal bones long, broad anteriorly, concave on the outer margin. Orbit complete or nearly complete behind in adults. Lower margin of mandible nearly or quite straight. Teeth large.

Colour. Earthy grey, with a more or less marked brownish tinge, darker and browner on the back, paler and whiter below, spotted throughout with black or dark brown. The spots are always much longer than broad, but they vary much in size, sharpness, and definition in different animals; in some they are small and comparatively indistinct, owing to an admixture of grey-tipped hairs;

in others well-marked and about an inch in length on the sides. From 6 to 8 black lines run from the forehead to the nape, breaking up into shorter lines and spots on the shoulders, but continued as lines of spots down the back. Cheeks greyish white, usually with two well-marked horizontal black or brown cheek-stripes. Several cross bands more or less distinct on the throat and fore neck. Markings on limbs variable; sometimes there are none, but usually there are bars or lines of spots outside the thigh and forearm, and the usual two bars inside the latter. Lower parts spotted. Tail more or less distinctly ringed with black above. Underfur brown, only the longer hairs with a long whitish portion near the end and a black tip; in the spots all the terminal part is black. Feet brown beneath.

Dimensions. Head and body 30 inches, tail 10½ (or with hair 11½), height 15; weight 17 lbs. The above are the measurements and weight of a male, but some specimens are larger. Kelaart gives head and body 34½. A large skull (I have seen even larger) measures 4·85 inches in basal length and 3·5 across the zygomatic arches; another 4·7 by 3·6; a small but quite adult skull 4·2 and 3·05.

Distribution. Bengal, probably Orissa, and the Indo-Gangetic plain generally, extending as far as Sind, whence I have a good specimen procured by Mr. H. E. Watson near Sehwan. Unknown in the peninsula of India, except on the Malabar coast, where it occurs from Mangalore to Cape Comorin, but not, so far as is known, to the northward near Bombay. This species occurs also in Ceylon. Along the base of the Himalayas the fishing cat is met with as far west as Nepal, and ranges throughout Burma, Southern China, and the Malay Peninsula. So far as is known, *F. viverrina* does not appear to be found in the Malayan islands, but it is said to exist in Formosa.

Habits. This species haunts marshy thickets near rivers, swamps, or tidal creeks, and differs from most cats in feeding upon fish. It also, according to Buchanan Hamilton, eats freshwater mollusca such as *Ampullaria* and *Unio*, both of which abound in many of the Indian swamps. Hodgson found that one specimen brought to him had eaten a large snake. The fishing cat, however, like other members of the genus, doubtless kills such mammals and birds as it can. It is said to be very ferocious; both in Bengal and in Malabar it has been known to kill calves, and sheep are not unfrequently destroyed by it. Mr. Baker wrote from Malabar that it often killed pariah dogs, and he had known young infants carried off by it from their parents' huts. A still more remarkable instance of its ferocity is mentioned by Blyth, a newly caught male of this species in his possession having killed a tame young leopardess of twice its own size, after breaking through the partition that separated the cages.

Frequently *F. viverrina* is savage in confinement, but Blyth says he had several males perfectly tame and considered this a particularly tamable species.

36. Felis bengalensis. *The leopard Cat.*

Felis bengalensis, *Kerr, Animal Kingdom*, p. 151 (1792); *Blyth, Cat.* p. 60; *id. P. Z. S.* 1863, p. 184; *Jerdon, Mam.* p. 105; *Anderson, An. Zool. Res.* p. 164; *Elliot, Mon. Fel.* pl. xxi; *Blanford, P. Z. S.* 1887, p. 627.
Felis javanensis, *Desmarest, Nouv. Dict. Hist. Nat.* vi, p. 115 (1816); *Horsf. Zool. Res. Java*, pl.
Felis sumatrana *Horsf. Zool. Res. Java*, pl. (1824).
Felis minuta, *Temm. Mon. Mam.* i, p. 130 (1827).
Felis nipalensis, *Vig. & Horsf. Zool. Journ.* iv, p. 382 (1829).
Felis chinensis, *Gray, Charlesworth's Mag. N. H.* i, p. 577 (1837).
Leopardus ellioti *and* Leopardus horsfieldii, *Gray, A. M. N. H.* x, p. 260 (1842).
Felis pardochrous, *Hodgs. Calc. Journ. N. H.* iv, p. 286 (1844), no description.
Felis ogilbii, *Hodgs. Calc. Journ. N. H.* viii, p. 44.
Felis jerdoni, *Blyth, P. Z. S.* 1863, p. 185; *Jerdon, Mam.* p. 107.
Felis undata, *Blyth, Mam. Birds Burma*, p. 27, *nec Desmarest.*
Felis wagati *and* Felis tenasserimensis, *Gray, P. Z. S.* 1867, p. 400.
Felis herschelii, *Gray, Cat. Carn. &c. Mam. B. M.* p. 28 (1869).
Felis javensis, *Elliot, Mon. Fel.* pl. xxviii (1883).

Chita Billa, H.; *Ban Biral*, Beng.; *Wagati*, Mahr. of Ghats; *Thit-Kyoung*, Arakan; *Kye-thit, Thit-kyúk, Kya-gyúk*, Burmese; *Kla-hla*, Talain and Karen; *Rimau-ákar*, Malay.

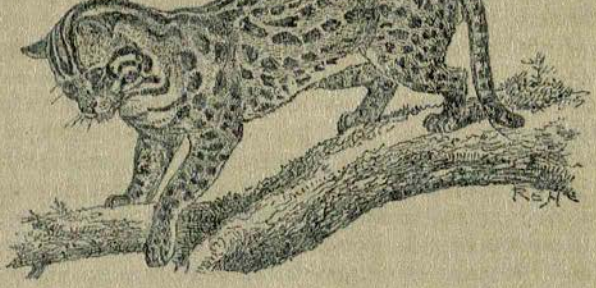

Fig. 19.—*Felis bengalensis*. (Elliot, Mon. Fel.)

About the size of a domestic cat or rather smaller, but with longer legs. Tail rather less than half the length of the head and body together, sometimes perhaps not more than one third, but some measurements give more than one half. Ears moderate, rounded at the tip. Pupil circular (perhaps elliptical in strong light).

The skull is rather elongate, low and convex. Orbit incomplete behind. The inner lobe of the upper flesh-tooth small. Anterior upper premolar rarely deficient.

Colour. Ground-colour above pale fulvous, varying from rufous to greyish, below white, ornamented throughout with numerous more or less elongate, well-defined spots, either black throughout,

or, especially on the sides, each spot partly black and partly brown, the two colours passing into each other. The fur is brown at the base, and many of the fulvous hairs have white tips, producing a grizzled appearance on the ground-colour. The size of the spots is very variable; they have a general tendency to a linear arrangement, especially on the back. The limbs and underparts are all spotted, the spots on the belly being as a rule, though not always, well defined, and there are spots on the upper surface of the tail, the lower surface of which is generally unspotted, but spots are frequently met with in Himalayan and Burmese varieties. Towards the end of the tail the spots usually become small transverse bars. There is almost always a white band running up to the forehead from the inside of each eye. Four longitudinal black bands commence on the forehead, and are continued over the head to the hind neck, breaking up into short bands and elongate spots on the shoulders; less distinct bands or spots occasionally come in between the two median head-stripes on the forehead and shoulders, but these two stripes frequently coalesce on the back of the neck, diverging again between the shoulders and being continued as rows of spots to the tail. There are generally two well-marked horizontal cheek-stripes, the lower of which is often joined to a transverse stripe across the throat; other transverse stripes, sometimes broken into rows of spots, cross the lower neck and breast. There are the usual two dark bands inside the forearm, and a large whitish spot on the black outside surface of each ear.

In kittens the general colour is pale brown, and the markings are ill-defined.

The coloration of this species is so variable that it is difficult to give a description that is applicable to all the varieties.

Dimensions. Head and body 24 to 26 inches, tail 11 to 12 or more (*Jerdon*). Some varieties are considerably smaller; a Burmese specimen measured by Tickell had the above two measurements only 16 and 9·5 inches. A large Nepalese skull is 3·1 inches in basal length from the foramen to the premaxillaries, and 2·5 wide across the zygomatic arches; whilst in the small Burmese variety (*F. wagati* of Gray) the length and breadth of a skull similarly measured are only 2·7 and 2·1 inches.

Distribution. The leopard cat is common in the Himalayas as far west as Simla, in Lower Bengal, Assam, the Burmese and Malayan countries, Southern China, Sumatra, Java, Borneo, and the Philippines. It is also found in the Syhádri Range or Western Ghâts of India, Coorg, Wynaad, Travancore, &c., and in some, perhaps all, of the other forest-regions of the peninsula, though not very abundantly. I have never seen a specimen during several years' wanderings in the Central Provinces and the northern part of the Bombay Presidency. There is, however, a skin said to be from the neighbourhood of the Coromandel coast in the Calcutta Museum; and a living specimen from Jeypore, west of Vizagapatam, was quite recently given to the Zoological Gardens in London by Mr. G. T. Egan. According to Jerdon *F. bengalensis* is also found

in Ceylon, but this I doubt; its occurrence is not mentioned by Kelaart, Blyth, or Tennant, nor is there a specimen from the island in the British Museum, which is well supplied with Cingalese Mammalia.

Varieties. In this species the tendency to variation in markings appears to reach its maximum so far as Asiatic cats are concerned, though the American ocelot is at least equally variable. The variation is shown by the number of synonyms this animal has received, and by the great difference in the number of the species into which it has been divided by different naturalists.

After examining the fine series of skins and skulls in the British Museum I have come to the same conclusion as Blyth and Jerdon, and class all the various races as varieties of a single species. As in many other cats, there is a grey phase, to which belong *F. nipalensis*, *F. jerdoni*, *F. javanensis*, *F. chinensis*, and a rufous phase. According to Blyth (Cat. Mam. A. S. p. 60, and P. Z. S. 1863, p. 184, note), some of the grey forms, and especially *F. nipalensis*, are hybrids with domestic cats. There is considerable variation, too, both in size and in the length of the tail.

The following are the principal named varieties :—

The ordinary Himalayan type, *F. pardichroa* of Hodgson, has pale rufescent back and sides, with spots usually subangular or angular in form, each spot black behind and brown in front. In some specimens the spots are large and almost triangular with the points directed backwards, in others the spots are simply elongate ovals and of small size. *F. nipalensis* is only a grey phase, and, as already remarked, was perhaps founded on a hybrid. There is, however, one variety unnamed, the specimen of it in the British Museum having been received in that collection from the East India Museum after the death of Dr. Gray. In this the black spots tend to form longitudinal lines and to enclose bands of rich rufous brown between them, the bands being more or less broken up into large rosettes, dark brown inside and bordered by imperfect black rings; the pale rufescent ground-colour occupies but a small portion of the surface. This is the most beautiful form I have seen. According to Mr. Blyth, there is a similar specimen in Calcutta.

The small race called *F. wagati* by Dr. Gray is, I believe, not the *Wagati* of Sir W. Elliot*, for the specimens are all labelled Moulmain, and are probably the Burmese form. Judging from comparison with a single specimen from the peninsula of India, the Burmese and Southern Indian races are very similar†, except that the latter is larger; the ground-colour in both is light with large distinct elongate black spots. *F. tenasserimensis* is founded on a flat skin, and differs in no important character. Further south in the Malay Peninsula and the Malay Islands, extending to Borneo and the Philippine Islands, is another small form, *F. minuta* v.

* Madras Jour. Lit. Sci. x. p. 108.

† According to McMaster (Notes on Jerdon, p. 29) Burmese individuals are smaller and more richly marked than those from the Western Ghâts.

sumatrana, with smaller and more numerous rounded black spots. Some specimens appear to have a decidedly shorter tail than typical *F. bengalensis*, but others have the tail as long as in the normal form. *F. javanensis* (of Horsfield and Gray, *F. javensis* of Elliot in part) is a peculiar small grey form with very small spots, those on the back elongate but deep blackish brown rather than black, those on the sides brown. *F. jerdoni*, as represented by two specimens in the British Museum, both named by Blyth, and one of which must be considered the type, is merely a smaller form, absolutely indistinguishable from *F. javanensis* so far as markings and structure are concerned; there is no evidence of the locality whence these specimens came, but they are probably Malayan.

Habits. *F. bengalensis* is only found in forests, where it preys on birds and small quadrupeds. In Coorg, Jerdon was informed that it lived in hollow trees, and carried off poultry from villages. Jerdon also quotes Hutton to the effect that this cat breeds in May, and has only 3 or 4 young, in caves or beneath masses of rock.

All observers agree that *F. bengalensis* is excessively savage and untamable. Usually when caged it remains crouched in a corner during the daytime and snarls at all who come near. But a specimen that I have recently seen in the Zoological Gardens, Regent's Park, paced its cage, came when called by its keeper, and appeared thoroughly tame. This is the individual, already mentioned, from Jeypore in the Madras Presidency.

37. Felis rubiginosa. *The rusty-spotted Cat.*

Felis rubiginosa, *I. Geoffr. Bélanger, Voy. Indes Or., Zoologie*, p. 141, pl. 6 (1834); *Kelaart, Prod.* p. 47; *Jerdon, Mam.* p. 108; *Holdsworth, P. Z. S.* 1871, p. 756; *Elliot, Mon. Fel.* pl. xxix.

Namali pilli, Tamil, Madras; *Verewa puni*, Tamil, Ceylon; *Kula diya*, Cingalese.

Size smaller than that of an ordinary domestic cat. Tail about half the length of the head and body. Fur short and soft. Ears small, rounded at the end. Two upper premolars on each side; the anterior pair are wanting, as in the lynxes. The bony orbit is complete behind.

Ground-colour above and on the sides rufescent grey, below white, body and limbs spotted. Some Ceylon specimens are bright ferruginous with a slight greyish tinge only. The fur of the upper parts is hair-brown, varying in depth of shade, at the base, then pale brown; numerous longer hairs are intermixed, in which the pale brown passes into rufous brown followed by a white ring, the tip being rufous to dark brown. The spots on the back and sides are brown to pale ferruginous, darker on the back, paler and redder on the sides; all are small, somewhat elongate, especially on the back, and arranged in longitudinal lines. The spots on the belly are dark brown and larger. In the ferruginous Ceylon variety none of the spots are red, all are brownish black. Four dark lines, sometimes with one or two shorter broken bands

in the middle, run from the eyes and base of the nose over the head, almost without interruption, and the two inner are continued between the shoulders as two well-marked, elongate, slightly diverging stripes without any other spots or bands between them. Behind the shoulders the bands are continued in the form of spots, other spots intervening. Cheek-stripes and throat-bands as in other cats, but usually ferruginous, the bands outside the forearm dark brown. There is a well-marked dark band inside each eye. Ears outside brown, with a large pale spot on each. Tail rufous grey, nearly the same colour as the back above, much paler below, finely punctulated, but without any distinct spots or stripes.

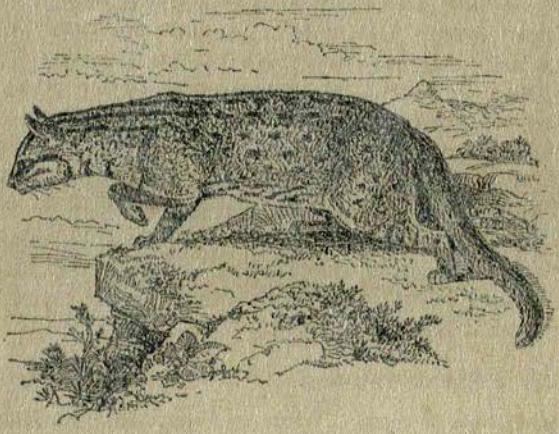

Fig. 20.—*Felis rubiginosa.* (Elliot, Mon. Fel.)

Dimensions. Head and body 16 to 18 inches, tail 9·5. A skull measures 2·55 inches in basal length and 2·05 in breadth across the zygomatic arches.

Distribution. Southern India and Ceylon. Unknown on the Malabar coast, but not uncommon in the Carnatic. Sterndale also obtained it at Seoni in the Central Provinces, but it appears to be rare so far north.

Habits. Jerdon says:—"This very pretty little cat frequents grass in the dry beds of tanks, and occasionally drains in the open country and near villages, and 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. Sir W. Elliot notices that he has seen several undoubted hybrids between this and the domestic cat, and I have also observed the same."

It is doubtful whether Jerdon's information as to this cat not living in jungles is correct, for Holdsworth found it inhabiting forests in Ceylon. Sterndale had two young kittens at Seoni and fully confirms Jerdon's account of their being easily tamed, exceedingly graceful and agile. A young village cat which, after one of the pair died, he obtained as a companion to the survivor, was far inferior in activity and in its power of climbing.

Another cat that has been procured from the Malay Peninsula, Sumatra, and Borneo, and which, although not hitherto recorded from any locality further north than Province Wellesley, may possibly be found to extend into the southern portion of the Tenasserim Provinces, is *F. planiceps*, Vigors. The following description will enable this species to be recognized:—

F. planiceps. About the size of a domestic cat. Tail short, a quarter to a third the length of the head and body. Orbits completely enclosed by bone, and the anterior upper premolar larger and better developed than in any other living cat, having two roots. Colour dark rich red-brown above, the fur having a silvery speckled appearance, owing to an intermixture of hairs with white tips; below white, more or less spotted or splashed with brown.

38. Felis manul. *Pallas's Cat.*

Felis manul, *Pallas, Reise Russ. Reichs*, iii, p. 692 (1776); *Elliot, Mon. Fel.* pl. x.
Felis nigripectus, *Hodgs. J. A. S. B.* xi, p. 276, with plate (1842).

Size of a domestic cat. Fur soft, long and very thick. Ears short and rounded. Tail very thick, bushy, cylindrical, about half the length of the head and body.

The skull is of very peculiar shape, being remarkably broad for its length everywhere. The orbits, too, are directed forward more than in any other cat. The upper surface of the skull is highly convex. The muzzle is broad, the nasals of moderate size, slightly concave on the outer margins. The teeth are well developed, the inner lobe of the flesh-tooth very small, and in the only skull I have examined the anterior upper premolar was wanting on both sides.

Colour. Silvery grey to yellowish buff, with a silvery wash above, darker on the back; breast brown, remainder of lower parts white. Fur brown at the base, then buff or grey; ends of long hairs white with black tips on the back. Across the loins are a few more or less distinct black transverse stripes, narrow and far apart, and on the tail are 6 or 7 nearly equidistant narrow black rings and a black tip. In some specimens, too, there are a few black transverse stripes on the limbs. The head is spotted above, and there are the usual two dark horizontal stripes across each cheek.

Dimensions. Head and body of a male 18¾ inches, tail 8¼, height 9, length of ear $1\frac{3}{16}$ (*Hodgson, MS.*). A skull measures in basal length 3 inches, breadth across zygomatic arches 2·8. Weight according to Pallas 6 to 7½ lbs.

Distribution. Tibet, extending into Ladák, whence there is a specimen, procured by General R. Strachey, in the British Museum collection. The species, however, does not appear to have been observed on the south side of the main Himalayan range. To the northward *F. manul* is found as far as Siberia, being common in Mongolia.

Habits. According to Pallas this cat lives amongst rocks in the deserts of Central Asia, and feeds on small animals.

39. Felis ornata. *The Indian desert Cat.*

Felis ornata, *Gray, Hardwicke's Ill. Ind. Zool.* i, pl. 2 (1832), bad figure; *id. P. Z. S.* 1867, p. 401; *Blyth, J. A. S. B.* xxv, p. 441; *id. Cat.* p. 63; *Elliot, Mon. Fel.* pl. xxxii; *Thomas, P. Z. S.* 1886, p. 55.

Felis servalina, *Jardine, Naturalists' Library, Felinæ*, p. 232, pl. 25 (*F. ornata* on plate).

Felis torquata, *Blyth, P. Z. S.* 1863, p. 185, *partim*; *Jerdon, Mam.* p. 110, *partim* (*nec F. Cuv.*, Chat du Nepal, *Hist. Nat. Mam.* pl. 126).

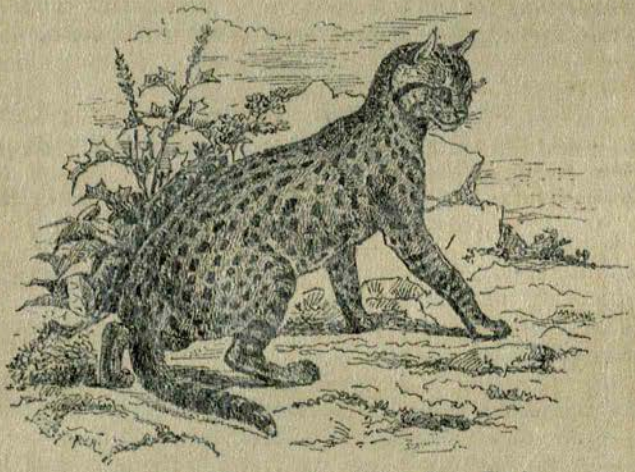

Fig. 21.—*Felis ornata.* (Elliot, Mon. Fel.)

Size of a domestic cat. Tail tapering, about half the length of the head and body. Ears well developed, pointed. Fur short.

The skull is broader and shorter than those of *F. chaus* and *F. bengalensis*. Lower edge of mandible very convex. Inner lobe of upper flesh-tooth well developed, being quite as large as the anterior outer lobe, or larger.

Colour. Very pale sandy (fulvescent grey or light isabelline), with numerous small black roundish spots on the body, and still smaller elongate spots on the crown and nape, those on the crown having a tendency to form longitudinal bands. Fur of back dusky grey near the base, thence to near the end pale rufescent, tip still paler. There are some narrow black cross lines outside the limbs, and two distinct black bars inside each forearm, also the usual cheek-stripes, which are brown. The lower parts are pale rufescent, with a few

black spots; the chin, throat, and front of the breast white and unspotted, the fore neck rufescent. Ears externally the same colour as the back, with a few elongate brown hairs at the end. Tail with some black transverse bands above, which form rings towards the end; the tip is black. Paws black beneath.

Dimensions. Head and body 18 to 22 inches, tail 9 to 10, hind foot from calcaneum 4·5. Basal length of an adult female skull 3·25, zygomatic width 2·75; a smaller male skull 2·85 by 2·35. The sexes do not appear to exhibit any constant difference in size.

Distribution. Throughout the drier regions of Western India, from the Punjab and Sind to Saugor and Nágpúr, not extending, however, to the Gangetic valley, and rare south of the Nerbudda. It is common in the Indian deserts east of the Indus, in Sind, Western Rájputána, and Hurriana.

Habits. The desert cat inhabits sandy plains and sand-hills, where its principal food in all probability consists of *Gerbilli* (*G. hurrianæ*). It is not found in wooded country. It is not by any means particularly nocturnal.

According to Dr. Scott, as quoted by Blyth, this cat, like *F. rubiginosa*, *F. chaus*, and other species, breeds with domestic cats, and in some parts of the country inhabited by *F. ornata* many of the village cats are similarly spotted.

Until recently this animal was represented by but two skins, one of them immature, in the British Museum collection. It appears to be also poorly represented in Calcutta. The receipt of six beautiful specimens and skulls, obtained near Sámbhar in Rájputána by Mr. H. M. Adam, and presented to the British Museum by Mr. Hume, has served to show that *F. ornata* is a well-marked species and distinct from *F. torquata*, to which it was united by Blyth and Jerdon.

A cat much resembling *F. ornata* is found inhabiting Eastern Turkestan, and was named by me *F. shawiana*. Although nearly allied to the Indian desert cat, *F. shawiana* appears to be larger with a shorter tail.

40. Felis torquata. *The waved Cat.*

Felis torquata, *F. Cuv. Hist. Nat. Mam.* pl. 126 (1826); *Jerdon, Mam.* p. 110, *partim*; *Thomas, P. Z. S.* 1886, p. 55.
Felis inconspicua, *Gray, Charlesworth's Mag. N. H.* i, p. 577 (1837).
? Felis huttoni, *Blyth, J. A. S. B.* xv, p. 169; xvii, p. 247, xxii, p. 581.

Size of a domestic cat. Tail tapering, about half the length of the head and body, or rather more. Ears rounded at tips.

Skull short and high, very similar to that of *F. ornata*. The minute anterior upper premolar, instead of being placed as in *F. ornata*, *F. caligata*, and many other cats, halfway between the second premolar and the canine, is close to the former in both the skulls examined, and in one there is an additional equally minute premolar in front, close to the canine. The position of the normal anterior premolar close to the second is common in domestic cats, Indian and European.

Colour. Ash-grey, varying in some skins to brownish or rufescent, lower parts buff. Fur on back grey at the base and sometimes throughout; in other skins it becomes rufescent, always having a dark brown or blackish subterminal portion, and a whitish or yellowish tip. Narrow longitudinal dark bands, often very indistinct, run along the crown and back; and there are numerous interrupted narrow dark brown or black transverse (vertical) bands or rows of spots on the sides, extending as cross rows of spots to the anterior portion of the abdomen. There are cross bands on the fore neck; the breast and lower abdomen remaining unspotted. The usual markings are found on the cheeks. Tail with more or less distinct black rings on the posterior half and a black tip. Paws black or dark brown beneath.

Dimensions. A male obtained in Kashmir measured—head and body 22 inches, tail 12. A female from Rájputána measured—head and body 20 inches, tail without hair at the end 10, with 10½, ears 2 outside, hind foot 4·9. In the fully adult skull of the latter the basal length is 2·95, zygomatic breadth 2·4.

Distribution. The type of *F. torquata* was said to be from Nepal; the exact locality of *F. inconspicua* is not recorded, but specimens precisely similar have been obtained by Captain Boys and Mr. Adam in Rájputána, and by Sir O. B. St. John in Kashmir. This cat must therefore be widely dispersed throughout Northern India, though it does not appear to be common.

Nothing especial is known of the habits, and it is far from improbable that specimens of the present form are merely descendants of tame cats that have run wild. The converse is, however, equally probable, that this is the aboriginal race from which Indian domestic cats, and possibly those of other countries are derived; and the circumstance that skins from parts of India so distant from each other as Nepal, Rájputána, and Kashmir are precisely similar is in favour of the latter view. The characters of the upper premolars distinguish *F. torquata* from the allied *F. caffra* (or *F. caligata*), to which, however, *F. huttoni*, described by Blyth from Afghanistan, may perhaps belong.

41. Felis chaus. *The jungle Cat.*

Felis chaus, *Güldenstädt, Nov. Com. Pet.* xx, p. 483, pls. 14, 15 (1776); *Kelaart, Prod.* p. 48; *Blyth, Cat.* p. 63; *id. P. Z. S.* 1863, p. 186; *id. Mam. Birds Burma*, p. 28; *Jerdon, Mam.* p. 111; *Elliot, Mon. Fel.* pl. xxxiii.

Felis catolynx, *Pallas, Zoog. Ros.-As.* i, p. 23, pl. ii.

Felis affinis, *Gray, Hardwicke's Ill. Ind. Zool.* i, pl. 3.

Felis kutas, *Pearson, J. A. S. B.* i, p. 75.

Felis (Lynchus) erythrotis, *Hodgson, J. A. S. B.* v, p. 233.

Felis jacquemontii, *I. Geoffr. Jacquemont, Voyage*, iv, p. 58, *Atlas*, ii. pls. ii, iii.

Jangli-billi, H.; *Khatás*, H. and Beng.; *Banberál*, Beng.; *Gúrba-i-Kuhi*, Pers.; *Bául, Bhóoga*, Mahr.; *Berka*, Hill-tribe of Rajmahál; *Mant-bek*, Can.; *Kada bek* or *Bella bek*, Wadári; *Katu-punai*, Tam.; *Jurká pilli*, Tel.; *Cherru puli*, Mal.; *Kyoung tset-kún*, Arakanese.

Size exceeding that of a domestic cat. Pupil round. Ears often with a few longer hairs at the end, not amounting, however, to a distinct tuft as in the lynxes. Tail short, one third to two fifths the length of the head and body. Fur variable, short in specimens from plains of India, longer in Himalayan skins.

Skull strong, elongate, postorbital processes bending sharply downwards; the brain-case broad behind the postorbital processes; nasal bones broad anteriorly, more or less concave at the side. The lower jaw convex below. Inner lobe of upper flesh-tooth well developed, as large as the outer anterior lobe.

Colour of the body varying from sandy grey or yellowish grey to greyish brown; back darker, often rufescent, sometimes dusky; lower parts fulvescent or rufescent white. Fur in general fulvescent white (isabelline) from the base to near the tip, where it is greyish white, the tip being black, sometimes on the back rufous near the tip; the underfur near the body in some specimens brown. The limbs are sometimes transversely barred with dusky, sometimes not; there are usually the two broad dusky bands inside the forearm. Foot and tarsus dusky brown beneath. Tail ringed with black near the end, and the tip black. Cheek-stripes and band across breast sometimes present and of a pale ferruginous tint. Ears pale rufous outside, the tips generally blackish or black. There is some long whitish hair on the anterior portion of the ear inside.

In adult specimens there are usually no markings on the body or limbs, but exceptions occur. In some skins more or less distinct vertical rows of spots or wavy lines may be traced on the sides. A black variety is occasionally found, and Dr. Scott procured it both near Hansi and in the neighbourhood of Umballa.

Dimensions. Hodgson gives:—head and body 22 inches, tail with hair at the end 11, without 10, height at shoulder 16; weight 14 lbs. Jerdon's measurements are:—head and body 26, tail 9 to 10, height at shoulder 14 to 15; and of a large specimen killed at Umballa, total length 39 inches, height 18, weight 18 lbs. (Appendix, p. ii). A moderate-sized skull is 3·75 inches long (basal length), and nearly 3 broad across the zygomatic arches. In a large male skull the basal length is nearly 4 inches, in a small (? female) specimen 3·35.

Distribution. F. chaus is the common wild cat of India from the Himalaya to Cape Comorin, and from the level of the sea to 7000 or 8000 feet or perhaps higher on the Himalayas. It is found in Ceylon and also extends into Burma, but has not been recorded further east. A wild cat observed by Col. Tickell at the Andaman Islands (J. A. S. B. xxxii, p. 86) may perhaps have been this species. It has an extensive range through Western Asia and Northern Africa.

Habits. This cat frequents either jungles or open country, and is very partial to long grass, reeds, cornfields, sugar-cane fields, and similar places, being often seen in the neighbourhood of villages. It feeds on birds and small mammals, and is said to be especially destructive to partridges, peafowl, hares, and other game.

Jerdon was actually robbed by a jungle cat of a peafowl he had shot; and McMaster relates a similar incident that happened to himself. The same observer says that he shot one in Burma in deep black mud, where it was perhaps hunting for fish or crabs. The voice, according to Blyth, differs from that of the domestic cat.

The jungle cat is a very savage animal. McMaster says he was once charged by a large individual that he had wounded with shot. As a rule, even if captured young, *F. chaus* appears to be untamable, but exceptions occur. It frequently breeds, however, with the domestic cat of India, and some of the latter closely resemble it in colouring, although they are considerably smaller. It is said to breed twice in the year, and to have three or four young at a time.

42. Felis caracal. *The Caracal.*

Felis caracal, *Güldenstädt, Nov. Com. Pet.* xx, p. 500 (1776); *Blyth, Cat.* p. 64; *Jerdon, Mam.* p. 113; *Elliot, Mon. Fel.* pl. xli.

Siyáh-gush (black ears), Pers. and H.; *Tsogde*, Little Tibet (? Gilgit); *Ech*, Ladák (Vigne).

Size intermediate between *F. chaus* and *F. lynx*. Build slender, limbs long. Tail one third the length of the head and body. Ears long and pointed, with a long black tuft of hair at the end.

Skull convex above, facial portion short. Teeth well developed. Anterior upper premolar wanting; inner lobe of upper flesh-tooth moderate.

Colour above varying from rufous fawn-colour to brownish rufous, generally the former in Indian specimens, unspotted; below paler rufous or white, often with indistinct rufous spots. Fur nearly the same colour throughout, slightly paler near the roots, some white tips intermixed on the back, and in darker specimens black tips also, giving a peculiar grizzled appearance. Limbs and tail the same colour as the body, the tip of the latter sometimes black, but not always. Ears outside black, often mixed with white, inside white; a blackish spot on each side of the upper lip, and others, not always distinct, above each eye and on each side of the nose. A white or pale spot inside, and another below each eye.

Dimensions. Head and body 26 to 30 inches, tail 9 to 10, ear 3, height 16 to 18 inches. Basal length of skull 4·55 inches, breadth across zygomatic arches 3·8.

Distribution. Found in the Punjab, Sind, North-western and Central India, and the greater part of the Peninsula except the Malabar coast, but rare everywhere. Ball met with it in Chutia Nagpur. Unknown in Bengal and the Eastern Himalayas, but said by Vigne to be found in the Upper Indus valley *. Outside of India this species occurs in Mesopotamia, and perhaps on the

* Perhaps only tamed specimens; see J. A. S. B. xi, p. 759.

highlands of Persia, in Arabia, and throughout a large part of Africa.

Habits. Very little appears to have been recorded concerning this animal in the wild state. It probably lives amongst bushes and grass, not in thick forests. It is said to prey on gazelles, small deer, hares, and birds, and frequently to capture birds as they fly off by springing upon them to a height of 5 or 6 feet from the ground. It is destructive to peafowl, floriken, cranes, and, doubtless, to partridges.

The caracal is easily tamed, and is trained to catch birds, such as peafowl, cranes, &c., and small deer, gazelles, hares, or foxes, and also to kill for sport—a favourite amusement in parts of India, according to Blyth, being to pit these cats against each other to kill pigeons out of a flock. The caracals are let loose amongst the pigeons feeding on the ground, and each cat often strikes down ten or a dozen birds before they can escape by flight. Some Indian princes are said to have kept a large number of caracals for the purpose of hunting. Vigne, who saw them used, says that their speed is, if possible, greater in proportion even than that of the hunting leopard.

Although the caracal has the long limbs, ears, skull, and dentition of a lynx, it wants the ruff, and has a fur better adapted to its tropical or subtropical haunts.

43. **Felis lynx.** *The Lynx.*

Felis lynx, *L. Syst. Nat.* i, p. 62 (1766); *Elliot, Mon. Fel.* pl. xxxix; *Scully, P. Z. S.* 1881, p. 201.
Felis isabellina, *Blyth, J. A. S. B.* xvi, p. 1178 (1847); *id. Cat.* p. 64; *id. P. Z. S.* 1863, p. 186.

Patsalan, Kishmiri.

A strongly built cat, high on the legs, with a short tail, less than one fourth the length of the head and body. Ears long, pointed, and with a long black tuft of hair at the end. Pupil round. Hair of the hinder part of cheeks lengthened and hanging down, forming a partial ruff. Fur soft, thick. Pads of feet more or less concealed by hair. Intestines shorter than in other cats, being only twice the length of the body.

Skull very convex above, the facial portion short and broad. Orbits incomplete behind. In adults there are only two upper premolars.

Colour varying from pale sandy grey (isabelline) to rufous fawn with a greyish wash, and in some (European) specimens to ferruginous red, lower parts white. In summer there are small black spots on the body, and these are persistent in some cases even in winter fur (probably in young individuals); but Asiatic specimens in winter coats are unspotted except on the flanks and limbs, and even there the markings are often wanting. The spots are evidently very variable. The fur is fawn-coloured with a more or less

rufous tinge, towards the roots the hairs are brownish; the tips of the longer hairs are white, some black tips being often intermixed on the back. Terminal portion of the tail black. Ears outside grey, with the margins, tip, and terminal tuft black. Some black hairs are intermixed with the ruff, and, in some cases, there is an imperfect dark band across the throat. There are sometimes blackish or black spots on the belly.

The Tibetan lynx was distinguished by Blyth as *F. isabellina* on account of its pale colour and of the hair on the toes being shorter. Both these differences are probably due to the Tibetan lynx living in open ground amongst rocks, whilst the common lynx of Europe dwells chiefly in forests. The lynx of Gilgit, where there is some forest, is intermediate in coloration; and I can find no constant character of importance by which *F. isabellina* is distinguishable from the common lynx. Some skins procured by Hodgson from Tibet are undistinguishable from Gilgit and Turkestan specimens.

Dimensions. Head and body 33 inches, tail 7¾; weight about 60 lbs. In a skull, the basal length is 4·6 inches, zygomatic breadth 4.

Distribution. Found in the Upper Indus valley, Gilgit, Ladák, Tibet, &c., also throughout Asia north of the Himalayas, and Europe north of the Alps.

Habits. The lynx is found in Gilgit at heights above 5000 feet, but occurs at a great elevation in Tibet, Captain Kinloch having shot a female and captured the cubs near Hanle when hunting *Ovis hodgsoni*, which does not descend below 14,000 or 15,000 feet in summer. In Tibet, as in Europe, this species has the character of being extremely bloodthirsty and savage. Scully mentions that a pair of them killed six sheep in one night near Gilgit. Lynxes prey on birds and on all mammals that they are able to kill, from goats to mice; but the stories told of their attacks upon animals the size of red-deer, *Cervus elaphus*, are scarcely credible. The keenness of sight and hearing in the lynx have long been famous; the animal is well known to be an excellent climber, and to lie in wait for his prey on trees. Lynxes have two or three young at a time, and usually hide them in caves and holes amongst rocks. The young are born with the eyes not opened. Young animals are easily tamed.

Genus **CYNÆLURUS**, Wagler, 1830.

The claws only partially retractile, always remaining partly exposed. Limbs longer than in any true cats. Body slender. Skull with the infraorbital foramen on each side very small, and frequently represented by two or more foramina. Inner lobe of the upper flesh-tooth quite rudimentary.

The only species generally admitted is *C. jubatus*; a peculiar form, with woolly hair and pale spots, from South Africa, has been distinguished as *C. lanea* (*Felis lanea*, Sclater, P. Z. S. 1877, p. 532),

but there is some question as to whether this is more than an accidental variety. Other nominal species will be found recorded in books.

44. Cynælurus jubatus. *The hunting Leopard.*

Felis jubata, *Schreber, Säugeth.* iii, p. 392, pl. cv (1778); *Jerdon, Mam.* p. 114; *Ball, P. A. S. B.* 1877, p. 169.
Felis guttata, *Hermann, Obs. Zool.* p. 38 (1804).
Cynailurus jubatus, *Blyth, Cat.* p. 65; *Elliot, Mon. Fel.* pl. xliii.

Chita, Laggar, H.; *Yuz* and *Yuz-palang*, Pers.; *Chitra*, Gond; *Chita puli*, Tel.; *Chircha* and *Sivungi*, Canarese; *Cheeta* of many European naturalists.

As long as the common leopard or panther, but much higher and more slender. Pupil round. Ears short and round. Fur coarse, hairs of neck somewhat lengthened, hair of belly rather long and shaggy. Tail more than half the length of the head and body.

Skull much resembling that of *F. uncia* in shape, high and broad, very convex above and wide behind the postorbital processes. The facial portion short and broad, nasals broad, maxillaries short and high. Orbits incomplete behind. Opening of posterior nares broad. Anterior upper premolar generally present.

Colour from tawny (pale brownish yellow) to bright rufous fawn above and on the sides, paler below, spotted almost everywhere with small round black spots without any pale centres, and not arranged in rosettes. Chin and throat buffy white, unspotted. A black line from the anterior corner of each eye to the upper lip, and another less marked, or a row of spots in some specimens, from the hinder corner of the eye to below the ear. Ear black outside, base and margins tawny. Tail spotted above; the spots, towards the end, passing into imperfect rings.

Young covered with long hair, grey in colour, without any spots. Sterndale states, however, that on clipping the hair the spots are found on the underfur. A young animal in the British Museum is figured by Elliot, and is brownish grey on the back, chocolate-brown on the legs and lower parts, with indications of darker spots. This is, doubtless, in process of change into the colour of the adult.

Dimensions. Length of head and body about 4·5 feet, tail 2·5, height 2·5 to 2·75 (*Jerdon*). A skull is 5·35 inches long in basal length, and 4·55 across the zygomatic arches.

Distribution. The hunting leopard is found throughout Africa and South-western Asia, extending from Persia to the countries east of the Caspian and into India. In this country it occurs throughout a great portion of the peninsula, from the Punjáb through Rájputána and Central India to the confines of Bengal (I once saw a skin that had been brought in by a local shikári at Deoghar, in the Southál Pergunnahs, south of Bhágalpur, and Ball saw another, under similar circumstances, at Sambalpur), and in

the Deccan. How far south in India *C. jubatus* ranges does not appear to be recorded; the animal is not found on the Malabar coast, nor, according to Jerdon, in Ceylon, and its range is probably nearly the same as that of the Indian antelope. It does not appear to be found north of the Ganges, and it occurs nowhere east of India.

Habits. Being used in the chase, and considered an important or even necessary appanage to the state of many Indian princes, the hunting leopard is eagerly sought after by the particular class of men who capture wild animals; and as only the adult is valued, its habits are well known to those who occupy themselves with capturing and training it. Their accounts are, of course, like all such descriptions by uneducated men, in all parts of the world, a mixture of observed facts and traditionary fable; but some of their most interesting statements appear to be confirmed by independent testimony. In Sterndale's 'Mammalia of India and Ceylon,' p. 202, an admirable description of the capture of two hunting leopards is quoted from the 'Asian;' whilst Jerdon describes, from his own observation, the training of a young animal brought up in captivity, and quotes from Buchanan Hamilton *, Vigne †, and W. Elliot ‡ accounts of the method in which the "chita" is used to hunt antelope. A capital description is also given by McMaster §.

The principal haunt of this feline in India is in low, isolated, rocky hills, near the plains on which live antelopes, its principal prey. It also kills gazelles, nylgai (Jerdon once observed a pair stalking some of the latter), and doubtless occasionally deer and other animals; instances also occur of sheep and goats being carried off by it (a goat was once taken away by one from my own camp in Khándesh); but it rarely molests domestic animals, and has not been known to attack men. Its mode of capturing its prey is to stalk up to within a moderate distance of between 100 to 200 yards, taking advantage of inequalities in the ground, bushes, or other cover, and then to make a rush. Its speed for a short distance is remarkable, far exceeding that of any other beast of prey, even of a greyhound or kangaroo hound, for no dog can at first overtake an Indian antelope or a gazelle, either of which is quickly run down by *C. jubatus* if the start does not exceed about 200 yards. McMaster saw a very fine hunting leopard catch a black buck (*Antilope cervicapra*) that had about that start, within 400 yards. It is probable that for a short distance the hunting leopard is the swiftest of all mammals.

This animal, according to the accounts of the men who capture it, usually passes two days, after gorging itself, in resting in its lair, and on the third day repairs to a particular tree, which forms a rendezvous for other animals of the species. On this tree it

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* The quotation is said to be from the 'India Sporting Review.'
† Travels in Kashmir, Ladak, &c. i, p. 41.
‡ Mad. Journ. L. S. x, p. 107.
§ Notes on Jerdon's Mammals of India, p. 32.

sharpens its claws, leaving marks that are recognized by the hunters, who capture the leopards by means of nooses made from the dried sinews of antelopes, and pegged to the ground around the tree. From the few accounts given of their habits in the wild state, it is apparent that these felines frequently hunt in pairs or families; hence, perhaps, the appearance of several at a particular spot, where they amuse themselves by playing about before going off to hunt.

As already mentioned, only adults are captured, Indian shikáris considering that the young can only be properly trained by the parents. The same view prevails in India with regard to falcons. The hunting leopard is easily tamed, about six months being required to reduce him to a complete state of obedience and to complete his training. Many of these animals, when tamed, are as gentle and docile as a dog, delighting in being petted, and quite good tempered even with strangers, purring and rubbing themselves against their friends, as cats do. They are usually kept, when tame, on a charpai or native bedstead, attached by a chain to the wall, and are not shut up in a cage. Young hunting leopards are, of course, soon domesticated, as was shown in the case of that commemorated by Jerdon. So far as I have heard, however, this animal has not been known to breed in captivity.

The method of hunting with the "chita," as described by several observers, is the following:—The leopard is hooded, so as to blindfold it; it is fastened by a thin cord attached to a leather belt round its loins or to a collar, and is taken on a bullock-cart to the neighbourhood of the antelope. The latter have no fear of the ordinary country carts, which they see daily, and there is, consequently, no difficulty in driving to within a short distance of the herd. The leopard is then unhooded and slipped, and, according to the distance at which the antelope may be, either springs towards them at once, or, taking advantage of inequalities in the ground, follows them at a run until he gets within such a distance as to enable him to make his rush with success. He usually seizes the buck, if there is one with the herd, but this is probably due to the fact that the buck is generally the last; and, as pointed out by Sir W. Elliot, the mir-shikáris (keepers) always endeavour to get the herd to run across them, when they drive on the cart and unhood the "chita." The leopard rushes at the antelope and fells it, it is said, by striking its legs from under it with his paw; he then seizes the quarry by the throat, and holds it until the keepers arrive. The antelope's throat is then cut, and some of the blood collected in the wooden bowl from which the hunting leopard is fed, and offered to the latter, who laps it eagerly, advantage being taken of the opportunity to slip on his hood again. A good hunting leopard is said sometimes to capture four bucks in a morning.

Baldwin, in the 'Large Game of Bengal,' states that the hunting leopard has occasionally been speared from horseback. It gives but a short run, and rarely shows fight. McMaster also relates an

instance of this animal being speared, and states that the hunting leopard, although at first it far outpaced the horse, was easily caught, and tried to hide in a bush, out of which it was put and speared easily.

Family VIVERRIDÆ.

The second family of the Æluroidea contains the civets, paradoxures or tree-civets, ichneumons or mangooses, and their allies, a much more diversified assemblage than the *Felidæ*. In the *Viverridæ* the head and body are more elongate, the muzzle more produced, the limbs shorter in proportion, and the teeth of the molar series more numerous than in the cats. All Indian forms have four premolars on each side above and below, one or two true molars, five toes to each foot, and a long tail. The claws vary in retractility, and so does the extent to which the tarsus and metacarpus are clad with hair beneath, this again depending upon the circumstance that some types, like *Viverra* and *Prionodon*, are truly digitigrade, whilst others, as *Arctictis* and *Paradoxurus*, are more or less plantigrade. Many of the genera have peculiar anal and preanal glands, the secretion from which is highly odoriferous.

The auditory bulla is externally constricted and internally divided by a septum, which is conspicuous from the meatus. An alisphenoid canal is present, except in *Viverricula*.

Further details of the anatomy will be found in Prof. Mivart's papers already quoted (P. Z. S. 1882, pp. 145, 459).

No representatives of this family exist in America or Australia, all being confined to the warmer parts of the Old World, and chiefly to Africa, Madagascar, and South-eastern Asia, one species extending into Spain.

The *Viverridæ* are variously divided by different authors. In the system here followed they comprise three subfamilies, one of which, *Cryptoproctinæ*, by some considered a distinct family, consists of a single species peculiar to Madagascar. The other two are represented in India, and are thus distinguished:—

A. Claws strongly curved and more or less retractile. Auditory bulla oval or subconical, broad and truncated behind, narrow in front. Apex of paroccipital process in general projecting slightly beyond the bulla; prescrotal glands generally present ..... *Viverrinæ*.

B. Claws lengthened, exserted, not retractile. Auditory bulla somewhat pear-shaped. Paroccipital process not projecting beyond bulla, but spread out, and in adults lost on its posterior surface. No prescrotal glands..... *Herpestinæ*.

Subfamily VIVERRINÆ.

African and Oriental forms both occur in this subfamily, but the latter are more numerous. The following genera are found within our area :—

A. Ears not tufted; tail not prehensile.
  a. Tarsus and metatarsus hairy behind; tail with dark and light rings.
    a'. Two upper true molars; a black gorget.
      a''. An erectile black dorsal crest ..... VIVERRA.
      b''. No crest ..... VIVERRICULA.
    b'. One upper true molar; no gorget ..... PRIONODON.
  b. Tarsus half naked behind; tail (in Indian species) not ringed.
    a'. Teeth large; a naked preanal (in males prescrotal) glandular tract ..... PARADOXURUS.
    b'. Teeth small; no naked preanal or prescrotal tract ..... ARCTOGALE.
B. Ears tufted; tail prehensile; tarsus naked behind ARCTICTIS.

Genus VIVERRA, Linn., 1766.

A crest of elongate and erectile black hairs along the middle of the back. Feet truly digitigrade, the metatarsus, metacarpus, and feet being hairy throughout, with the exception of a central and five toepads on all feet and a metacarpal pad on each fore limb.

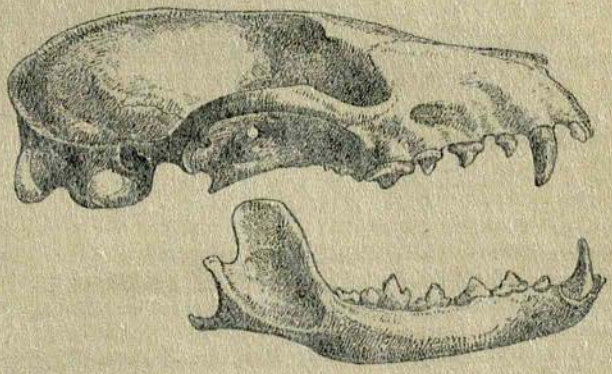

Fig. 22.—Skull of *Viverra zibetha*.

Claws small, partially retractile, and blunt. Pupil vertical. Female with three pairs of ventral teats. Fur coarse. One or more black bands across the throat; tail ringed. All the species are larger than a domestic cat. None are known to be arboreal in their habits.

Dentition : i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{4-4}$, m. $\frac{2-2}{2-2}$. The teeth are strong and the hinder teeth in the molar series broad; the inner lobe of

the upper sectorial very large, nearly equal to the hinder lobe in size. The true upper molars are well developed. The lower sectorial has a large talon with two large inner and two small outer tubercles. The milk-dentition is figured by Mivart (P. Z. S. 1882, p. 155).

Vertebræ: C. 7, D. 13, L. 7 (or D. 14, L. 6), S. 3, C. 22–30.

This and the next genus comprise the true Civet-cats, from which the substance known as civet, largely used as a perfume, is obtained. It is the secretion of a pair of glands found in both sexes, just in front of the scrotum in the male, and in a corresponding position in the female. The secretion escapes by a number of minute orifices into a large sac, the external opening of which appears as a longitudinal slit, resembling a large vaginal aperture *. There are also two glands surrounding the anus, the secretion from which has a very different and extremely offensive odour. Various kinds of civet-cats, belonging to this and the next genus, are kept in small cages in some countries, and the civet collected from the pouch periodically; but I am not aware whether this is done anywhere in India.

Synopsis of Indian and Burmese Species.

A. No black stripe down the tail.
  a. Markings on sides indistinct or wanting..... *V. zibetha*, p. 96.
  b. Large transverse dark marks on sides ..... *V. civettina*, p. 98.
B. A black stripe down upper surface of tail.
  a. Large dark tail-rings not interrupted below.. *V. megaspila*, p. 99.

Remains of two species of *Viverra*, *V. bakeri* and *V. durandi*, the last-named larger than any existing civet-cat, have been found in the Pliocene beds of the Siwalik hills.

45. Viverra zibetha †. *The large Indian Civet.*

Viverra zibetha, *L. Syst. Nat.* i, p. 65 (1766); *Schreb. Säugeth.* iii, p. 420, pl. cxii; *Blyth, J. A. S. B.* xxxi, p. 331; *id. Cat.* p. 45; *Jerdon, Mam.* p. 120.

Viverra undulata, *Gray, Spic. Zool.* p. 9, pl. 8.

Viverra sp., *M'Clelland, Calc. Journ. N. H.* i. p. 56, pl. i.

Viverra orientalis, *hodie* melanurus, *Hodgson, Calc. Journ. N. H.* ii, p. 47.

Viverra melanurus *et* civettoides, *Hodgson, J. A. S. B.* x, p. 909, xi, p. 279 (no descriptions).

Khatás, Hindi (used for several other animals also); *Mach-bhondar*, *Bágdos*, *Pudo-ganla*, Beng.; *Bhrán*, Nepal Terai; *Nit biralu*, Nepal; *Kung*, Bhot; *Saphiong*, Lepcha; *Kyoung-myeng* (horse-cat), Burmese; *Tangalong*, Malay.

* Hodgson, Calc. Journ. N. H. ii, p. 54, pl. i, f. 1, 2; Mivart, P. Z. S. 1882, p. 147.

† The figures representing this species and *V. megaspila* in Sterndale's 'Natural History of the Mammalia of India' are apparently taken from other animals. The first figure much resembles the African *V. civetta*.

Ears small, rounded. Tail thick, scarcely tapering, more than half as long as the head and body. A crest of longer black erectile

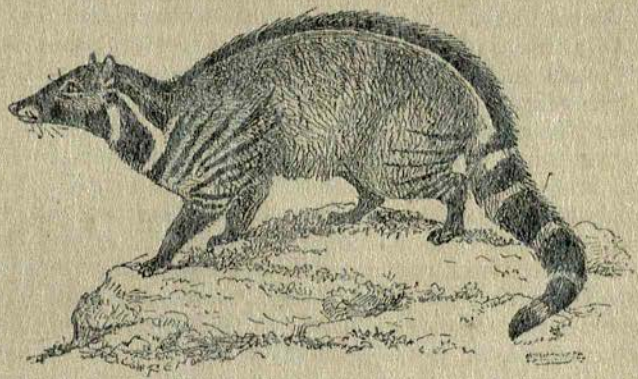

Fig. 23.—*Viverra zibetha*. (From Hodgson's drawings.)

hairs along the back from shoulders to insertion of tail. The scent-glands, when dissected out, are each 2·5 inches long by 1·5 broad.

In the skull the bony palate is continued about a quarter to half an inch behind a line joining the last upper molars, the termination being concave. Nasals short. Mandible convex below. Last upper molar one and a half times as broad as long, but last lower molar much longer than broad.

Colour. General coloration dark hoary grey, with often a brownish or yellowish tinge. Underfur brown; terminal portion of the longer hairs white with black tips on the upper part of the body. A black stripe, corresponding to the erectile crest, from between the shoulders to the first dark tail-ring, but not down the tail, which is completely surrounded by six broad black rings, the last terminal, all much broader than the white rings between them. A pale band borders the black dorsal line on each side, especially towards the rump. Sides of the body generally without markings; sometimes, however, indistinct spots and imperfect ocelli occur, forming wavy transverse bands on the sides, and longitudinal bands separated by narrow whitish lines on the loins. Legs indistinctly barred outside near the body, all the distal portions and the feet dark brown or black. Head grey; chin brown; a dark spot behind the ear; hind neck much mixed with black; front and sides of neck and upper breast white, crossed by a broad black gorget, and generally, but not always, by a narrower band in front and another behind; the hindmost meets a horizontal band running back from behind the ear along the side of the neck.

In a half-grown British-Museum specimen from Nepal the black dorsal band appears to extend in front of the shoulders. The coloration otherwise resembles that of the adult.

Dimensions. Head and body in an adult male 32 inches, tail 18, ears 2, height about 15; weight 18 to 25 lbs. A skull measures 5·25 inches in basal length, 2·7 in zygomatic breadth.

Distribution. Bengal, Assam, Burma, the Malay Peninsula, Siam, and Southern China. The range extends south and south-west of Bengal to Orissa and Chutia Nagpur, and probably some distance further south and west, and to the northward into Sikhim and Nepal, ascending the Himalayas to a considerable elevation.

Habits. The civet-cat is generally solitary. It hides in woods, bushes, or thick grass during the day, wandering into open country and often coming about houses at night. Not unfrequently it is found in holes, but whether these are dug by it is doubtful. It is said to be very destructive, killing any birds or small mammals it can capture, and often attacking fowls, ducks, &c., but also feeding on snakes, frogs, insects, eggs, and on fruits and some roots. Hodgson found in the stomachs of those he examined remains of fowls (evidently taken from a refuse-heap near a kitchen), rats, shrews, and frogs. Civet-cats take readily to water.

V. zibetha breeds in May or June, and has three or four young, which, according to Hodgson, are probably born with the eyes open. The period of gestation is not known. Hounds and all dogs are said to be greatly excited by the scent of this civet, and will leave that of any other animal for it.

Hodgson's species *V. melanura* was the uniformly coloured variety, *V. civettoides* that with transverse bars. In his drawings is the figure of a third form, said to have been brought from Tibet, covered on the body with small ocelli. I have a somewhat similar specimen, perhaps Tibetan, but less ocellated; it is probably the form said to be brought from the Chinese border of Tibet and called Kung by Tibetans (J. A. S. B. xxiv, p. 237).

46. Viverra civettina. *The Malabar Civet-Cat.*

Viverra civettina, *Blyth, J. A. S. B.* xxxi, p. 332 (1862); *id. P. Z. S.* 1864, p. 484; *id. Cat.* p. 44; *Jerdon, Mam.* p. 121.

"Dusky grey, with large transverse dark marks on back and sides; two obliquely transverse dark lines on the neck, which, with the throat, is white; a dark mark on the cheek; tail ringed with dark bands; feet dark. Size of the last (*V. zibetha*) or nearly so." (*Jerdon.*)

I have been unable to examine a specimen of this civet; but Mr. W. L. Sclater, who has recently compared the type with *V. zibetha*, writes to me that *V. civettina* is distinguished by having the hinder parts of the body covered with distinct large spots, and by the black rings of the tail being united by a black band above. This quite bears out Blyth's description. The large upper true molar in *V. civettina* is more quadrangular, 0·36 inch long by 0·4 broad, in *V. zibetha* 0·32 by 0·4; and in the lower jaw of the former the

first and second premolars are close together, in the latter widely separated.

The area inhabited by *V. civettina* is separated from that occupied by *V. zibetha* by a broad tract of country, there being no civet known to occur in the Central Provinces, Deccan, or Carnatic. It is therefore probable that *V. civettina* is a distinct species. The following account of its distribution is from Jerdon:—

"The Malabar civet-cat is found throughout the Malabar coast, from the latitude of Honore (Honawar) at all events to Cape Comorin, and very possibly it extends further north. It inhabits the forests and the richly wooded low land chiefly, but is occasionally found on the elevated forest-tracts of Wynaad, Coorg, &c. It is very abundant in Travancore, whence I have had many specimens. It is not recorded from Ceylon, but most probably will be found there. I have procured it close to my own house at Tellicherry, and seen specimens from the vicinity of Honore. I never obtained it from the Eastern Ghâts nor from Central India. It is stated by the natives to be very destructive to poultry."

47. Viverra megaspila. *The Burmese Civet.*

Viverra megaspila, *Blyth, J. A. S. B.* xxxi, p. 331 (1862); *id. P. Z. S.* 1864, p. 484; *Günther, P. Z. S.* 1876, p. 428, pl. xxxvii.
Viverra tangalunga, *Cantor, J. A. S. B.* xv, p. 197, *nec Gray.*

Kyoung-myeng, Burm.; *Músang-jebat*, Malay.

Tail less than half the length of the head and body, tapering. A band of erectile black hairs along the back, sometimes but not always less developed than in *V. zibetha*.

Bony palate extending nearly half an inch behind a line joining the last upper molars; termination very concave. The teeth larger and broader than in *V. zibetha*; hinder upper molar oval, not much broader than long; hinder lower molar very little longer than broad, and larger than that in *V. zibetha*.

Colour. Grey, sometimes with a yellowish or brownish tinge (the figure in P. Z. S. is too brown), scarcely paler below; underfur pale brown to whitish, the tips of the longer hairs grey or black. A black line down the back from the shoulders continued down the tail, which is ringed with dark brown or black; the proximal rings about the same breadth as the whitish interspaces, and (except sometimes the first) extending round the tail. Terminal portion of tail for a varying distance (sometimes half the length) black. Sides with spots, usually distinct, larger than in *V. zibetha* or *V. tangalunga* (about three quarters of an inch in diameter), tending to form transverse bands on the sides and longitudinal on the rump. Feet brown. Head grey; base of ear behind a little darker; hind neck dusky; chin brown; neck white in front and on sides, with two or three black gorgets, the anterior just behind the brown chin often wanting, the second well marked

across the throat, the third faint on the upper breast, but distinct on the side of the neck, where it runs forward to behind the ear.

Dimensions. A large individual measured 37 inches from nose to the root of the tail; tail 17·5 inches. Basal length of skull about 5·2 inches, zygomatic breadth 2·9.

Distribution. Burma, Malay Peninsula, Cochin China, and Sumatra. Recorded as far north as Prome.

Habits. Similar to those of *V. zibetha*. This civet is said by Cantor to have from one to three young at a time.

Viverra tangalunga, Gray, inhabits Java, Sumatra, Borneo, the Philippines, and, it is said, Malacca, but this requires confirmation. The only other species of the genus is the African *V. civetta*.

Genus **VIVERRICULA**, Hodgson (1838).

No erectile mane along the back; nails sharper and more curved than in *Viverra*; pollex and hallux shorter and more remote from the other toes. Foot and toepads precisely as in *Viverra*. The build is slighter, the size much smaller, the muzzle finer, and the whole animal more adapted for arboreal and climbing habits. The anal and prescrotal glands are similar.

In the skull there is, as a rule, no alisphenoid canal, although one is very rarely present. The anterior portion of the bulla in front of the constriction is much more swollen than in *Viverra*, so that the bulla looks considerably longer; the paroccipital process, too, seldom projects at all from the hinder part of the bulla, being generally rounded off against it. The teeth are small, compressed, and sharp, the formula being the same as in *Viverra*.

Vertebræ: C. 7, D. 13, L. 7, S. 3, C. 25.

The absence of an erectile mane, and the differences in the skull and structure of the feet, appear to justify the separation of the present genus, which resembles *Viverra* in its other characters. There is but a single species.

48. **Viverricula malaccensis.** *The small Indian Civet.*

Viverra malaccensis, *Gmel. Syst. Nat.* i, p. 92 (1788); *Jerd. Mam.* p. 122.
Viverra indica, *Geoffr., Desm. Nouv. Dict.* vii, p. 170 (1817); *Elliot, Mad. Journ. L. S.* x, p. 102.
Viverra bengalensis *and* V. pallida, *Gray, Hardwicke's Ill. Ind. Zool.* i, pl. 4; ii, pl. 6.
Viverra rasse, *Horsf. Res. Java*, pl.
Viverricula indica *and* V. rasse, *Hodgson, A. M. N. H.* i, p. 152 (1838).
Viverricula malaccensis, *Blyth, Cat.* p. 45; *Anderson, Zool. An. Res.* p. 166; *Thomas, P. Z. S.* 1886, p. 55.

Mashk-billa, Katás, H.; *Gandha gokal, Gando gaula*, B.; *Sogot*, Ho Kol; *Jowádi manjár*, Mahr.; *Saiyar, Bag-myál*, Nepal Terai; *Púnagin bek*, Can.; *Púnagú pilli*, Tel.; *Uralawa*, Cing. This animal is also called

Kasturi, a name properly belonging to the musk-deer, in parts of India. *Koung-ka-do*, Burmese; *Wa-young-kyoung-byouk*, Arakan.

Tail tapering, about two thirds to three quarters the length of the head and body. Ears short and rounded. Fur harsh and rather coarse. Teats 6, ventral. Pupil vertical.

In the skull the nasals are of moderate length, terminating posteriorly in front of a vertical plane passing through the anterior extremities of the orbits; the occipital crest is greatly developed. Bony palate extending back some distance behind the posterior molars. Mandible convex below.

Colour. Brownish grey to pale yellowish brown, with usually several longitudinal black or brown bands on the back and longitudinal rows of spots on the sides. In some specimens both lines and spots are indistinct, and the dorsal bands are occasionally wanting; but usually there are five or six distinct bands on the back and four or five rows of spots on each side. Neck-markings rather variable; generally there are two dark stripes from behind the ear to the shoulders, and often a third in front, crossing the throat. A dusky mark behind each ear and one in front of each eye. The head grey or brownish grey; chin often brown. Feet brown or black. Tail with alternating black and whitish rings, seven to nine of each colour. The underfur brown or grey (often grey on the upper parts of the body and brown on the lower); coarser hairs with long grey, brown, or black terminations, the grey hairs on the upper parts often tipped with black.

Dimensions. Head and body 21 to 23 inches, tail (including the hair at the end, which is about an inch long) 15 to 17, ear 1 to 1¼ long outside, height about 9; weight 5 to 6 lbs. A male skull measures 3·75 inches in basal length, 1·75 in zygomatic breadth; another 4 by 1·8.

Distribution. Throughout India, except in Sind, the Punjab, and the western parts of Rájputána. A specimen was obtained by Mr. Adam at Sámbhar. Also found in Ceylon, Assam, Burma, Southern China, the Malay Peninsula, Java, and some of the other Malay islands. This species likewise inhabits Socotra, the Comoro Islands, and Madagascar, but has probably been introduced, having been carried thither caged as a producer of civet.

Habits. The small civet inhabits holes in the ground, or under rocks, or thick bush, but appears not to have been observed in forest, although it is said to climb well and to be distinctly arboreal in its habits. It comes near human habitations, and has been met with taking refuge in drains and outhouses. It is frequently kept in confinement, and becomes perfectly tame. Jerdon states that he kept several, which caught rats, squirrels, and birds, and he adds that this species is kept by natives for the purpose of yielding civet. The food is varied, chiefly consisting of small animals, vertebrate and invertebrate, but partly of fruits and roots. Poultry are occasionally carried off by this civet. The female has usually four or five young at a birth.

Genus **PRIONODON**, Horsfield, 1823.

Syn. *Linsang*, Müller, 1839.

No dorsal mane. Form slender; limbs short; head and neck long; ears short, rounded; muzzle pointed; tail very long, cylindrical. Claws perfectly retractile and sharp; thumb and hallux near the other digits. There is on the inner proximal side a supplementary lobe to the central palmar and plantar pads, separated

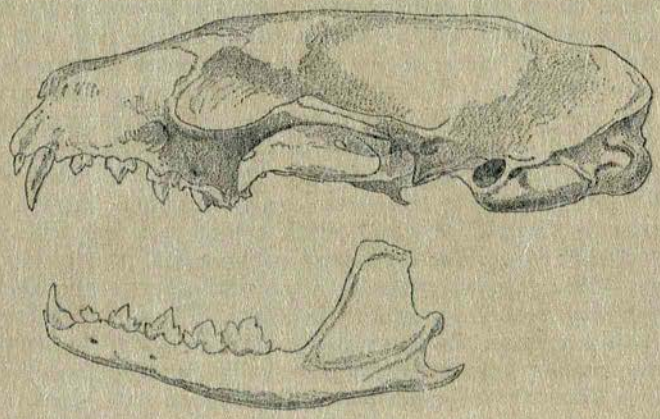

Fig. 24.—Skull of *Prionodon maculosus*.

from the other three lobes by hair in *P. pardicolor*, but not in the other species. Metatarsus and metacarpus hairy beneath. No prescrotal glands. Anal glands present. Fur soft. Female with four teats—two ventral anteriorly situated, and two inguinal. Colour fulvous, with bold black spots or markings. Tail ringed.

Dentition: i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{4-4}$, m. $\frac{1-1}{2-2}$; the posterior upper molar of *Viverra* wanting. The teeth are sharp and compressed.

Of this genus two species are found within our area, a third is Malay. All appear to be carnivorous; they may also, as suggested by Hodgson, live partly upon insects. An allied genus, *Poiana*, is the representative of *Prionodon* in Africa.

Synopsis of Indian and Burmese Species.

A. Smaller; head and body about 15 inches; skull $2\frac{1}{2}$ to $2\frac{3}{4}$; back with longitudinal rows of large spots ..... *P. pardicolor*, p. 103.

B. Larger; head and body 18 to 20 inches, skull 3; back with broad transverse bands ..... *P. maculosus*, p. 104.

49. Prionodon pardicolor. *The spotted Tiger-Civet.*

Prionodon pardicolor, *Hodgson, Calc. Journ. N. H.* ii, p. 57, pl. i, figs. 3, 6 (1842); viii, p. 40, pl. i; *Blyth, Cat.* p. 46; *Jerdon, Mam.* p. 124; *Anderson, An. Zool Res.* p. 166.

Zik-chúm, Bhot.; *Sílíyú*, Lepcha.

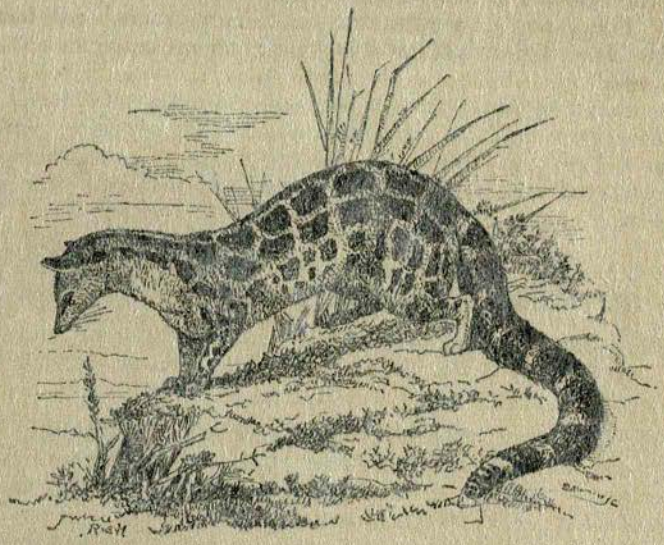

Fig. 25.—*Prionodon pardicolor.* (From Hodgson's drawings.)

Tail as long as the body and neck. Pupil round.

Skull with the zygomatic arch slight. The constriction of the bulla is very marked.

Colour. Fulvous (very pale brown), with large black spots above, whitish and unspotted below. Underfur slaty, tips of longer hairs buff or black. Head brown; frequently a black spot behind each ear. Four bands down neck, two on each side, two broader above from behind ears to between shoulders, the others lower down and more broken into spots; the two upper bands are continued as rows of large rounded spots down the back, a row of smaller irregular spots intervening, and about three more rows of spots, square or round, diminishing in size below, down each side. The spots also form about six or seven transverse rows. Limbs near the body spotted outside; feet pale brown, unspotted. Tail with about eight to ten dark rings separated from each other by the same number of pale rings, all passing right round the tail and subequal in breadth.

Dimensions. Head and body 14 to 15 inches, tail 12 to 13, height 5 to 5½; weight about a pound. Skull 2·5 inches long, 1·25 broad.

Distribution. The south-eastern Himalayas, extending thence

eastward to Yunan, where it was obtained by Anderson. It is not rare in the interior of Sikhim, probably at moderate elevations.

Habits. According to Hodgson, who had one example tame, this very beautiful and graceful little animal is "equally at home on trees and on the ground; it dwells and breeds in the hollows of decayed trees. It is not gregarious at all, and preys chiefly on small birds, which it is wont to pounce upon from the cover of the grass. The times of breeding are said to be February and August, and the litter to consist of two young, there being two litters each year."

The tame specimen (a female) was "wonderfully docile and tractable, very sensitive to cold and very fond of being petted." It was fed on raw meat, and refused fish, eggs, and fruits. It never uttered any sound. The animal was perfectly free from any odour.

50. Prionodon maculosus. *The Burmese Tiger-Civet.*

Prionodon maculosus, *W. Blanf. P. A. S. B.* 1878, p. 71; *J. A. S. B.* xlvii, pt. 2, p. 152, pls. vi, vii (1878); *Thomas, P. Z. S.* 1886, p. 66.

Tail a little shorter than the head and body, cylindrical. Skull larger and more strongly built than that of the other species, but the anterior portion of the bulla is much less swollen than in *P. pardicolor*. The pterygoid fossæ are very broad.

Colour. Grey, with about six broad rather irregular transverse brownish-black bands across the back, much broader than the intervening pale stripes (or the back may be described as brownish black with six narrow pale bars across). The dark bands are broken up on the sides of the body, forming interrupted longitudinal dark stripes, one of which is conspicuous and runs across the shoulder to the side of the neck, and is continued by spots beneath the ear to the eye. A broader dark band down the upper part of the neck on each side from a little behind the ear to behind the shoulder, where it passes into the transverse bands; between the two upper neck-bands are a few spots, as also on the fore neck, forming an imperfect gorget, and on the outside of the limbs. Lower parts and feet pale, unspotted. Nose dark brown mixed with grey; head generally brownish grey, dark around the orbits and in front of them; and two dark streaks running back from the eye, one to the crown, the other to join the lower neck-band. Ears dark behind. Tail with seven perfect blackish rings, alternating with pale interspaces, which are much narrower. Underfur ashy grey.

Dimensions. Head and body about 19 inches, tail 16 (without the hair at the end, which is less than an inch long), height at shoulder about 6, length of tarsus and hind foot 2·8, ear outside 0·65. Basal length of skull 2·9, zygomatic breadth 1·5.

Distribution. Tenasserim Provinces. One specimen was procured

by Mr. Limborg east of Moulmein, a second by Mr. W. Davison at Bánkasún in Southern Tenasserim.

Habits. Unknown; probably similar to those of *P. pardicolor*.

The only other species of the genus is that first described, *P. gracilis*, a small form with nearly the coloration of *P. maculosus*, but a very different skull. This kind inhabits Java, Borneo, and, it is said, Sumatra. It was also reported from Malacca by Cantor (J. A. S. B. xv, p. 199); but, judging by the dimensions given, it is not improbable that the species obtained by him was *P. maculosus*.

Genus **PARADOXURUS**, F. Cuv., 1821.

Syn. *Paguma*, Gray; *Platyschista*, Otto.

No mane. The naked soles of the feet are joined to the foot-pads (no hairy space intervening), and extend over considerably more than half the inferior surface of the carpus and tarsus. Claws small, sharp, retractile. Pupil vertical. Tail very long, not ringed in Indian species.

All the species are nocturnal and arboreal. The food is mixed, partly animal, partly vegetable. Prescrotal and anal glands as in *Viverra*, except that the former discharge into a slight fold instead of a deep pouch, and that their secretion has little or no scent of civet. There is a well-marked tract devoid of hair, corresponding to the glands, in front of the scrotum in the male and around the genito-urinary orifice in the female. The secretion from the anal glands is in some forms singularly fetid *.

Dentition: i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{4-4}$, m. $\frac{2-2}{2-2}$; as in *Viverra*. The teeth vary much in development and somewhat in form, being large in some species and small in others. The bony palate extends back above the posterior nares in a few kinds only. The pterygoid fossa is broad.

Vertebræ: C. 7, D. 13, L. 7, S. 3, C. 29–36.

The tail is not prehensile, but the animal appears to have the power of coiling it to some extent, and in caged specimens the coiled condition not unfrequently becomes confirmed and permanent. The name *Paradoxurus* was given by F. Cuvier to a specimen with the tail thus coiled, as represented in the 'Histoire Naturelle des Mammifères,' pl. 186. Nothing of the kind, so far as I am aware, has been observed in wild examples, nor has any use of the tail for prehensile purposes been recorded. At the same time it should not be forgotten that, owing to the exclusively nocturnal habits of *Paradoxuri*, they are seldom seen in the wild state.

* For a description of the glands see Hodgson, As. Res. xix, p. 77; Turner, P. Z. S. 1849, p. 25; also Mivart, P. Z. S. 1882, pp. 163, 519. There is also an excellent account, with figures, by Otto, Acad. Cæs. Leop. Nova Acta, xvii, p. 1095, pl. lxxiii.

I have described the history and synonymy of this genus in the 'Proceedings of the Zoological Society' for 1885, pp. 780–808.

Synopsis of Indian, Ceylonese, and Burmese Species.

A. Bony palate not extending a quarter of an inch behind the last upper molars.
  a. Vibrissæ black, a few of the lowest sometimes white near the base only; dorsal fur often long and ragged, with long black tips.
    a. Back unstriped; no pale band across forehead ..... *P. niger*, p. 106.
    b. Back generally striped; a pale band across forehead ..... *P. hermaphroditus*, p. 108.
  b. Vibrissæ dark brown; general colour the same ..... *P. jerdoni*, p. 111.
  c. Vibrissæ rufous; general colour dull rusty red ..... *P. aureus*, p. 110.
B. Bony palate extending more than half an inch behind the last upper molars; vibrissæ white ..... *P. grayi*, p. 112.

51. Paradoxurus niger. *The Indian Palm-Civet.*

Viverra nigra, *Desm. Mam.* p. 208 (1820).
Viverra bondar, *De Blainv. ibid.* p. 210 (1820).
Paradoxurus typus, *F. Cuv. Hist. Nat. Mamm.* pl. 186 (1821); *Elliot, Mad. Jour. L. S.* x, p. 103; *Kelaart, Prod.* p. 38 (1852).
Paradoxurus typus, P. pennantii, *and* P. bondar, *Gray, P. Z. S.* 1832, pp. 65, 66.
Platyschista pallasii, *Otto, Acad. Cæs. Leop. Nova Acta*, xvii, p. 1089, pls. lxxii, lxxiii (1835).
Paradoxurus hirsutus, *Hodgs. As. Res.* xix, p. 72 (1836).
Paradoxurus hermaphroditus, *Gray, P. Z. S.* 1864, p. 532 (*nec* Viverra hermaphrodita, *Pallas*).
Paradoxurus musanga, *partim, et* P. bondar, *Jerdon, Mam.* pp. 125, 128.
Paradoxurus niger, *W. Blanf. P. Z. S.* 1885, p. 792; *Thomas, P. Z. S.* 1886, p. 55.

Lakáti, Chingár (vulgarly *Khatás* and *Jhár-ka-Kutta*), H.; *Menuri*, Dakhani; *Bhám, Bhondar*, Bengali; *Machabba, Malwa*, Nepal Terai; *Togat*, in Singhbhúm; *Ud*, Mahr.; *Kera-bek*, Canarese; *Maru-pilli, Veruvú*, Tam.; *Manu-pilli*, Tel.; *Marrapilli*, Mal.; *Ugudora*, Cing.; *Toddy Cat* of Europeans in many parts.

Tail nearly or quite as long as the head and body, well clad with hair, slender, tapering very slightly. Fur coarse and often long, some piles, especially on the back, long and ragged; underfur short or wanting. Ventral mammæ usually six (sometimes four, according to Hodgson).

In the skull the bony palate extends but little, not more usually than about one eighth of an inch, behind a line drawn through the hinder edges of the posterior molars. Muzzle produced and

narrow, but varying in length. Upper sectorial tooth narrow, the inner lobe small and at the distal extremity of the tooth; the

Fig. 26.—Half palate of *Paradoxurus niger*. (P. Z. S. 1885, p. 793.)

inner margin of the tooth between the inner and hinder lobe distinctly concave.

Colour. Blackish grey to brownish grey. The fur in general long, and with long ragged coarse black tips; but these are, of course, much more developed in the cold season. Underfur, when present, ashy or brownish; the longer hairs, beyond the underfur, pale grey with long black tips. As a rule there are no stripes on the back, but indistinct dark bands and rows of spots are sometimes seen, especially in young specimens. Feet and the greater part of the legs, with the terminal portion (frequently more than half) of the tail, black. The tip of the tail is sometimes white, and individuals with the feet or other parts of the body white are occasionally found. Head-markings variable; face generally black or blackish, with a distinct white or grey spot below the eye, another (generally) on each side of the nose amongst the vibrissæ, and often another above the eye. There is not, however, in this species, as usually there is in the next, a distinct whitish band across the forehead. Vibrissæ black; occasionally, but rarely, a few of the lower are whitish or white towards the base.

Dimensions. Males are larger than females. A male measured: head and body 22·5 inches, tail 19·5; a female 20 and 17·5. In another female both were about 18 inches long. An adult female skull measures 3·9 inches in basal length, 2·3 broad; a male 4·15 by 2·35; another, very large (from Nepal), 4·4 by 2·55.

Distribution. Throughout the peninsula of India, from the foot of the Himalayas, and Ceylon, wherever there are trees; equally common in the wildest forest and about human habitations. It is

not found in the Punjab and Sind, and is rare in the bare parts of the North-west Provinces and the Bombay Deccan. Common in Upper Bengal, Southern India, and the West coast.

Varieties. Southern Indian and Ceylonese skins are blacker than those from Northern India; but I can find no other distinction between the typical *P. niger* (*P. typus* of many writers) and the form usually known as *P. bondar*, which is not nearly so yellow as Hodgson's description would lead a reader to suppose. Jerdon's description is manifestly taken from Hodgson's, and neither Blyth nor Jerdon had seen Hodgson's specimens. The *Viverra bondar* of De Blainville was founded on a drawing in Buchanan Hamilton's collection, preserved in the India Office Library. This drawing certainly represents, I think, the common Indian palm-civet.

Habits. The common palm-civet, tree-cat, or toddy-cat, is a familiar animal in most parts of India, though, being thoroughly nocturnal in its habits, it is but rarely seen in the daytime. It is arboreal, passing the day generally in trees, either coiled up in the branches, or in a hole in the trunk, and in places where cocoa-nut palms are common it frequently selects one of them for a residence. Mango-groves are also a favourite resort. It not unfrequently takes up its abode in the thatched roofs of houses; Jerdon found a large colony established amongst the rafters of his own house in Tellicherry. It is also found in dry drains and out-houses. It even occurs in large towns; I have known of one being caught in the middle of Calcutta. It is common in forest, and its presence may be detected, as Tickell observes in his MS. notes, by its droppings, rather smaller than a cat's, and always deposited on the top of the trunks of large fallen or felled trees.

The food of *P. niger* consists partly of small mammals, lizards, and snakes, birds and their eggs, and insects; partly of fruit and vegetables. This animal at times is very destructive to poultry; it is also said to do mischief in vegetable gardens. Throughout Southern India and Ceylon it is said to have an especial fondness for palm-juice or toddy, whence its popular name of toddy-cat. In confinement it will eat cooked food of almost any kind, boiled rice, vegetables, &c.

The palm-civet breeds in holes of trees, and has from four to six young. When taken young this animal is easily tamed.

52. Paradoxurus hermaphroditus. *The Malayan Palm-Civet.*

Viverra hermaphrodita, *Pallas, Schreber, Säugeth.* iii, p. 426 (1778).
Viverra musanga, *Raffles, Trans. Linn. Soc.* xiii, p. 252 (1822).
Paradoxurus prehensilis, P. musanga, P. dubius, P. hermaphroditus, P. pallasii, P. crossii, *and* P. finlaysonii, *Gray, P. Z. S.* 1832, pp. 65–68.
Paradoxurus quinquelineatus *and* P. musangoides, *Gray, Charlesworth's Mag. N. H.* i, p. 579 (1837).
Paradoxurus hirsutus, *Hodgs. As. Res.* xix, p. 72 (1836).
Paradoxurus nigrifrons, *Gray, List Sp. Mamm. B. M.* p. 55 (1843), no description; *id. P. Z. S.* 1864, p. 535.

Paradoxurus strictus *and* P. quadriscriptus, *Hodgs. A. M. N. H.* ser. 2, xvi, pp. 105, 106; *id. P. Z. S.* 1856, p. 396, pls. xlvii, xlviii.
Paradoxurus fasciatus, *Gray, P. Z. S.* 1864, p. 536, *nec* Viverra fasciata, *Desm.*
Paradoxurus musanga, *Jerdon, Mam.* p. 125, *partim*; *Blyth, Mam. Birds Burma*, p. 26.
Paradoxurus hermaphroditus, *W. Blanf. P. Z. S.* 1885, p. 794; *Thomas, P. Z. S.* 1886, p. 67.

Bhondar, Bághdánkh, Beng.; *Kyoung-won-baik, Kyoung-na-ga*, Burm.; *Khabbo-palaing*, Talain; *Sapo-mi-aing*, Karen; *Músang*, or *Músang Pándan*, Malay.

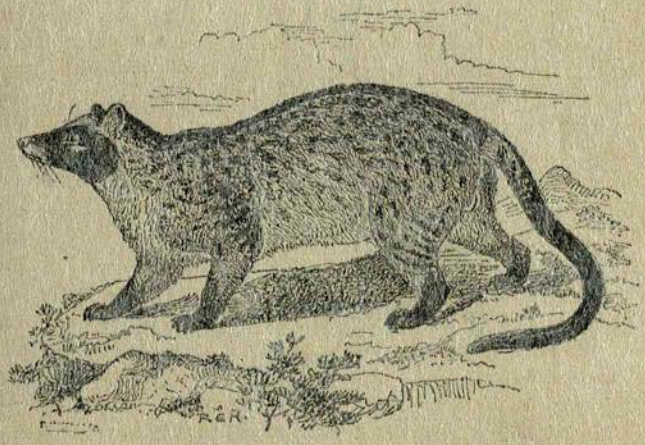

Fig. 27.—*Paradoxurus hermaphroditus.* (From a drawing by Colonel Tickell; position slightly altered.)

Structure generally much as in the last. Tail more than three quarters the length of the head and body. Fur as a rule not so long and ragged as in *P. niger*. Muzzle shorter; upper sectorial and molars larger, the former with a large inner lobe, and with the margin from the inner to the hinder lobe nearly or quite straight.

Colour. Brownish grey, sometimes ashy. Underfur, when present, brownish, the longer hairs light brown or grey, occasionally with black tips. The back is generally more or less distinctly striped longitudinally, most distinctly when the fur is short, the number of stripes varying and the lateral bands often replaced by rows of spots. Feet and terminal portion of tail (often one half or more) black; tail-tip sometimes white. Usually there is a distinct broad pale or whitish band across the forehead and in front of the ears, and as a rule this band is not crossed by black streaks, but sometimes there is a longitudinal black line in the middle and another running back from each eye. Generally a white or whitish spot occurs below the eye, and this spot sometimes is joined to the frontal band. The muzzle, including the eyes, the top of the head, with the ears and sides of the neck, are

black or dark brown. The markings, however, are very variable, and occasionally either the dorsal striping or the pale frontal band is wanting; but as a rule one or the other is distinct, and serves to distinguish this from the last species. Vibrissæ black, the lowest occasionally white near the base.

Dimensions. About the same as in *P. niger*. Head and body 20 to 25 inches, tail 16 to 20. A male skull from Burma measures 3·8 inches in basal length; 2·45 in zygomatic breadth.

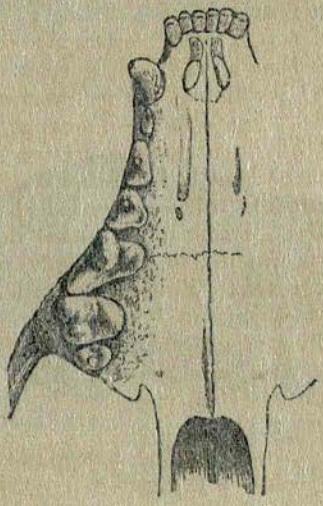

Fig. 28.—Half palate of *Paradoxurus hermaphroditus*.
(P. Z. S. 1885, p. 796.)

Distribution. Throughout the countries east of the Bay of Bengal —Burma, Siam, Malay Peninsula, Sumatra, Java, and Borneo. In Lower Bengal and at the base of the Himalayas, in Sikhim and in Assam, many of the *Paradoxuri* appear to belong to this species or to be intermediate between it and *P. niger*.

Habits. Precisely the same as those of *P. niger*.

This species has been united to the last by Blyth and Jerdon, and unquestionably the two pass into each other, so that it is a mere question of convenience whether they are called species or races. As a rule the Eastern form is distinguished both by having stripes on the back and a distinct frontal band, and by its larger and differently shaped upper sectorial teeth; and as the difference is considerable, and each form fairly constant over an immense tract of country, I think it better to use different names for the two.

53. Paradoxurus aureus. *The Ceylonese Palm-Civet.*

Paradoxurus aureus, *F. Cav. Mém. Mus. Hist. Nat.* ix, p. 48, pl. 4 (1822); *W. Blanford, P. Z. S.* 1885, p. 802, pl. 1.

Paradoxurus zeylanicus, *Kelaart, Prod.* p. 39; *Gray, P. Z. S.* 1864, p. 531; *Blyth, J. A. S. B.* xx, pp. 161, 184; *id. Cat.* p. 47; *nec* Viverra zeylonensis, *Pallas, nec* V. zeylanica, *Gmelin.*

Paradoxurus montanus, *Kelaart, apud Blyth, J. A. S. B.* xx, pp. 161, 184; *id. Prod.* p. 40.

Kula-wedda, Cingalese.

Tail about four fifths the length of the head and body. Fur moderately soft and thick, of uniform length, with but little woolly underfur. Mammæ four.

Skull very similar to that of *P. hermaphroditus*; the upper sectorial tooth is larger than in the Indian form (*P. niger*), the inner lobe being very well developed. The anterior upper true molar also is broader inside, being sometimes nearly rectangular.

Colour. Uniform dull rusty red or dull chestnut, passing, however, in some specimens into a darker and browner shade. The fur and underfur are of nearly the same shade throughout; no black tips to the hairs. Faint longitudinal dorsal streaks may be detected on many specimens. A white subterminal band is occasionally found on the tail. Vibrissæ whitish in dried skins, probably rufous in fresh specimens.

Dimensions. A fully grown female, according to Kelaart, measured: head and body 19 inches, tail 15·5, height 8. Males are probably larger. A skull measures 3·85 inches in basal length, and 2·35 in zygomatic breadth.

Distribution. The island of Ceylon, apparently generally distributed, the darker specimens being from a considerable elevation.

Habits. According to Kelaart, this species is less carnivorous than *P. hermaphroditus*, specimens obtained near Newera Ellia having fed entirely on the fruit of *Physalis peruviana* or Cape gooseberry (the *Tipári* of Bengal). In other respects the habits of the two are precisely similar.

54. **Paradoxurus jerdoni.** *The brown Palm-Civet.*

Paradoxurus jerdoni, *W. Blanf. P. Z. S.* 1885, pp. 613, 802, pl. xlix; 1886, p. 420.

Kárt-nai (forest-dog), Mal.

General structure apparently as in *P. hermaphroditus*, except that the fur is of uniform length. Woolly underfur but little developed.

Skull distinguished from that of all other species by the great length of the anterior palatine foramina, which, in the only specimen examined, are over 0·4 inch long and extend back as far as the hinder edges of the anterior pair of upper premolars. Teeth larger than in ordinary specimens of *P. hermaphroditus*.

Colour. Rich deep brown on head, shoulders, and limbs, back and sides the same but grizzled. Tail brown, tip often white. Fur and underfur brown, except a long subterminal grey ring on the longer hairs of the back and sides. Vibrissæ dark brown.

Dimensions. Approximately the same as those of *P. zeylonensis*. Adult skull 4·2 inches long from occipital condyles, 2·5 wide across zygomatic arches.

Distribution. Only known with certainty from the Palni hills in Madura, and the Nilgiris, but probably inhabiting all the higher ranges of Cochin and Travancore.

Habits. Not known.

55. Paradoxurus grayi. *The Himalayan Palm-Civet.*

Paradoxurus grayi, *Bennett, P. Z. S.* 1835, p. 118; *Jerdon, Mam.* p. 128; *Blyth, Mam. Birds Burma*, p. 26; *W. Blanf. P. Z. S.* 1885, p. 803.
Paradoxurus nipalensis, *Hodgson, As. Res.* xix. p. 76 (1836).
Paradoxurus tytlerii, *Tytler, J. A. S. B.* xxxiii, p. 188 (1864).

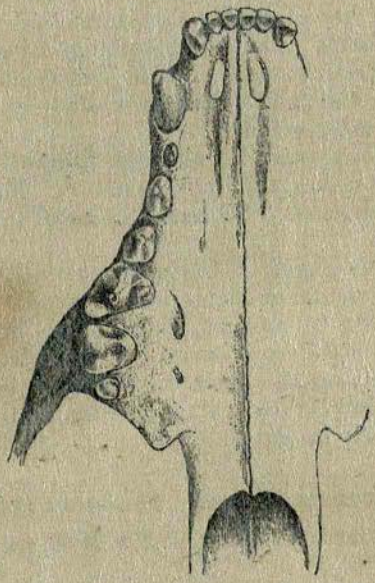

Fig. 29.—Half palate of *Paradoxurus grayi*. (P. Z. S. 1885, p. 804.)

Tail about the same length as the head and body. Fur varying in length, but much more uniform throughout the body, less harsh and more woolly than in *P. hermaphroditus*; woolly underfur frequently well developed. Mammæ 4.

In the skull the constriction behind the postorbital processes is much less than in the preceding species. The bony palate runs back above the posterior nares for 0·4 to 0·5 inch behind the hindmost molars, and is deeply concave at the end. The teeth are smaller than in *P. hermaphroditus*; the inner lobe of the upper sectorial less developed, and the first upper true molar more triangular. In old individuals the teeth, the molars especially, are much worn down.

Colour. Grey throughout, without markings on the body, the lower parts paler and whitish. Underfur brownish grey or dusky, paler towards the base, longer hairs whitish grey towards the end, the tips on the upper parts black. Frequently, though not always, the terminal half of the tail is dusky or blackish; feet usually brown. Head, including ears and chin, brown or blackish, with the exception of the forehead, a broad band beneath each ear, a narrower line down the nose, and a blotch or spot below each eye, where white hairs are conspicuously intermixed, but there is some variation in their proportion and distribution. Vibrissæ (whiskers) mostly white, some of the uppermost black.

Some specimens have a yellowish or brownish tinge, especially on the rump, thighs, and base of the tail.

Dimensions. Head and body 24 to 25 inches, tail with hair at the end about the same; weight 9 to 10 lbs. A very old skull measures 4·4 inches in basal length, 2·7 in zygomatic breadth.

Distribution. Throughout the Eastern Himalayas in Assam, Sikhim, and Nepal, and as far west as Simla, whence a specimen was obtained by Mr. Hume. Surgeon-General L. C. Stewart informs me he shot an individual near Landour, at an elevation of 7500 feet. This species also occurs in Arakan and the Andaman Islands, but not I believe in the Peninsula of India, some reported occurrences being probably due to mistaken identification.

Varieties. Some skins in the British Museum sent by Mr. Hodgson have short woolly fur, and are of a yellowish-brown colour. I believe them to be either a variety of *P. grayi* or perhaps dyed skins. The thinness and shortness of the fur show that the specimens were derived from a warm region, probably from near the base of the Himalayas. I have similar skins from Sikhim. The skull from one of Mr. Hodgson's skins is precisely similar to those of *P. grayi*.

The Andaman form *P. tytleri* is slightly smaller in size, but does not appear otherwise to differ. The head and body, according to the describer, measured 21 inches, tail 20; a stuffed skin in the British Museum is a little larger. The skull from the latter is 4·45 inches long, 2·65 broad.

Habits. We are indebted almost entirely to Mr. Hodgson's researches for a knowledge of this animal's habits. It is more frugivorous than the common palm-civet, but, like that species, feeds partly on animal, partly on vegetable food, and captures birds and small mammals. It lives and breeds in holes of trees, four young having been found on one occasion, and it inhabits mountain forests. In the Andaman Islands the smaller variety is said to do much havoc amongst pine-apples.

This species appears to be easily tamed. A tame individual kept by Hodgson was "very cleanly, and its body emitted no unpleasant smell, though, when it was irritated, it exhaled a most fetid stench, caused by the discharge of a thin yellow fluid from four pores, two of which are placed on each side of the anal aperture," the orifices, in short, of the anal glands. McMaster in his 'Notes on Jerdon,' p. 37, relates how his servants and dogs were

baffled in their endeavour to capture an animal, which he suggests may have been this species, at Russellkonda in the Northern Circars, by the singularly fetid fluid discharged by the creature. It is very possible, however, that the common palm-civet may have the same power as *P. grayi* of making itself obnoxious.

The tail was coiled, as it sometimes is in the common Indian palm-civet, in the original type of this species, a caged specimen.

Nearly allied to *P. grayi* is a still larger form, *P. leucomystax*, reddish brown in colour, with the head, except on the muzzle, paler. This is found in Malacca and the Malay Archipelago, and may possibly occur in Tenasserim *. *P. rubidus*, Blyth, J. A. S. B. xxvii, p. 275, is probably a variety of the same species.

Another form, considerably smaller than *P. grayi*, inhabits China, and was named *P. larvata* from the distinct head-markings. Both these species have the same prolonged bony palate as *P. grayi*, and all three externally resemble each other by their conspicuous white vibrissæ. By Gray they were distinguished as a genus, which he called *Paguma*.

The nature and affinities of the animal called *Paradoxurus laniger* (As. Res. xix. p. 79) by Hodgson are as obscure as its habitat. It is not quite certain that the only skin known, which is without a skull and in very indifferent condition, belongs to this genus; and it is questionable whether this specimen was obtained within the limits accepted in the present work. The following brief description may enable the form to be recognized if rediscovered. The fur consists of very thick woolly hair, without longer piles. The tail is thick at the base and tapers rapidly, it is but little more than half the length of the head and body. The soles of the feet are naked, but the toe-pads are almost surrounded by hair. There is a naked area in front of the anus. The colour is rather light rufescent brown (or greyish fawn), the hair grey at the base, light brown towards the tips, no black tips anywhere; the tail nearly the same colour throughout. The head has lost almost all its hairs. This skin was said to be from Tingri, Tibet, and evidently belonged to an animal inhabiting a cold climate (see P. Z. S. 1885, p. 807).

Genus ARCTOGALE, Peters, 1864.

All the teeth, except the canines, very small; those in the molar series scarcely or not in contact. The upper sectorial much rounded, the inner lobe median in position, not anterior. Palate frequently convex longitudinally between the upper sectorial teeth, the posterior portion sloping upward, and greatly produced above the posterior nares, the sides of which are arched towards each other; mesopterygoid fossa excessively narrow, less than half the breadth of the palate between the upper sectorial teeth. No pterygoid fossa.

* There was in 1877 a specimen in the Zoological Gardens, Calcutta, presented by Mr. Rivers Thompson, and said to have been brought from the Karen Hills, Burma.

There is no bald space in front of the scrotum or around the genital orifice; hence it is probable that the prescrotal glands, if they exist, are ill-developed. The soles are naked to a greater extent than in *Paradoxurus*, and the first digit on both fore and hind feet is more remote from the others. In other respects the two genera are similar.

56. Arctogale leucotis. *The small-toothed Palm-Civet.*

Paguma trivirgata, *Gray, List Sp. Mam. B.M.* 1843, p. 55; *Cantor, J. A. S. B.* xv, p. 201 (*nec* Paradoxurus trivirgatus, *Gray*, 1832).
Paradoxurus leucotis, *Blyth, Horsf. Cat.* p. 66 (1851); *id. J. A. S. B.* xxvii, p. 274; *id. Mam. Birds Burma*, p. 26.
Paradoxurus prehensilis, *Sclater, P. Z. S.* 1877, p. 681, pl. lxxi, *nec* Viverra prehensilis, *Blainv.*
Arctogale trivirgata, *Gray, P. Z. S.* 1864, p. 543; *Mivart, P. Z. S.* 1882, p. 163, figs. 8 & 9.
Arctogale leucotis, *W. Blanf. P. Z. S.* 1885, p. 789.

Kyoung-na-rwek-phyu, Arakan; *Kyoung-na-ga*, Tenasserim; *Musdng-ákar*, Malay.

Fig. 30.—*Arctogale leucotis.* (P. Z. S. 1877, pl. lxxi.)

Tail about the same length as the head and body. Fur short, of uniform length, not harsh.

Skull narrow and elongate. Postorbital processes long, zygo-

matic arches weak. The bony palate extends more than half an inch behind the last upper molars.

Colour. Fulvous grey (whity-brown) to dusky grey, or occasionally brown above, much paler below. Fur in pale specimens sometimes grey throughout; in darker skins brown near the base, then grey, tipped on the back with dark brown or black. Along the

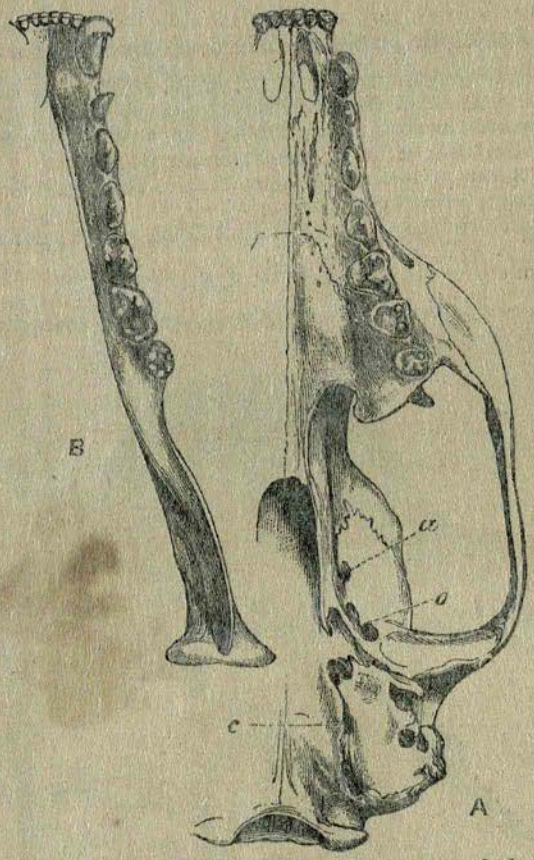

Fig. 31.—Half cranium (A) and mandible (B) of *Arctogale leucotis*, nat. size. *a*, anterior opening of alisphenoid canal; *o*, foramen ovale; *c*, carotid canal (compare fig. 15, p. 51, *ante*). (Mivart, P. Z. S. 1882.)

back run three longitudinal dark bands, either continuous or broken into spots; sometimes these bands are indistinct or wanting, but generally they are well marked. The head above, including the crown and ears, usually darker, often ashy or black; a narrow white line generally runs down the middle of the forehead and nose, or part of the distance. In Burmese specimens the tips of the ears are often whitish. Whiskers dark brown. Sides of neck pale, like the lower parts. Feet and terminal portion of tail brown or black.

Dimensions. Head and body of a large male 26·5 inches, tail 27. Skull 4 inches in basal length, 2·3 in zygomatic breadth.

Distribution. This well-marked form is found east of the Bay of Bengal, from Sylhet, and, according to Sterndale, Assam, through Arakan and Tenasserim to Malacca, Sumatra, and Java. Said by Mason to be common in Tenasserim.

Habits. Nothing particular recorded. When taken young *A. leucotis* is easily domesticated. Tickell and, probably, Mason mistook the Tenasserim form of *P. hermaphroditus* for this species.

The type of Blyth's *Paradoxurus leucotis*, that originally described by Horsfield, is now in the British Museum, and is a young and pale specimen of the present form.

Hemigale hardwickei (*Paradoxurus derbyanus*), a Malayan animal allied to *Paradoxurus*, and formerly referred to that genus, is distinguished by having the soles of the feet naked to a much smaller extent, though more than in *Viverra* or *Prionodon*, and by its dentition. The coloration is very peculiar, pale brownish grey, with a variable number (usually 5 or 6) of broad, dark transverse bands on the back, longitudinal stripes on the nape, and rings on the basal portion of the tail. This animal ranges from the Malay Peninsula to Borneo.

Genus **ARCTICTIS**, Temminck, 1824.

Syn. *Ictides*, Valenciennes.

Tail long and truly prehensile. Ears short, tufted. Feet thoroughly plantigrade, the whole hinder surface of tarsus and

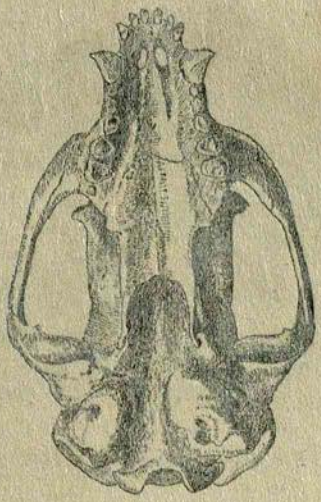

Fig. 32.—Skull of *Arctictis binturong*.

metatarsus being naked. Claws short, half retractile, compressed, slightly curved. Fur coarse and long. Pupil vertical. Large prescrotal glands opening into a deep fold.

Dentition: i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{3-3}$, m. $\frac{2-2}{2-2}$; four lower premolars sometimes occur, and the last upper molar is often wanting. Canines large, compressed, very sharp behind, concave externally in front of posterior edge. Molars small, rounded; both they and the incisors are slightly separate from each other.

Vertebræ: C. 7, D. 13–14, L. 6–7, S. 3, C. 34.

Only a single species is known. A good account of the anatomy is given by Garrod, P. Z. S. 1873, p. 196, and 1878, p. 142. Flower and Mivart have confirmed the view adopted by Blyth and Jerdon, that the genus is closely allied to *Paradoxurus*.

57. Arctictis binturong. *The Bear-cat, or Binturong.*

Viverra ? binturong, *Raffles, Linn. Trans.* xiii, p. 253.
Arctictis binturong, *Temm. Mon. Mamm.* ii. p. 308; *Cantor, J. A. S. B.* xv, p. 192; *Blyth, Cat.* p. 49; *Jerdon, Mam.* p. 130; *Blyth, Mam. Birds Burma*, p. 26.

Young, Assamese; *Myouk-kyá* (Monkey-tiger), Burmese; *Untarong*, Malay.

Tail nearly as long as the head and body, very thick at the base, clothed with bristly, long, straggling hairs, longer than those of the body. Fur coarse and long, some piles longer than the rest of the fur, especially on the back.

In the skull the bony palate runs back for a considerable distance above the posterior nares. No pterygoid fossa.

Fig. 33.—*Arctictis binturong.*

Colour. Black, more or less grizzled on the head and outside of the fore limbs, and sometimes throughout the body. Fur and under-fur either black throughout or brown at the base. On the head and outside of the fore limbs, and often on the back, there is a sub-terminal grey or rufous-grey ring on the longer hairs. In young

specimens there are long grey or rufous tips to the fur. The ears have a white border, but the tufts are black.

Dimensions. Head and body 28 to 33 inches, tail 26 to 27. An adult female skull measures 4·95 inches in basal length, and 2·95 in breadth across the zygomatic arches.

Distribution. From Assam, throughout Arakan, Tenasserim, Siam, and the Malay Peninsula to Sumatra and Java. The reports of this animal's occurrence in the Himalayas are of doubtful accuracy.

Habits. Like the *Paradoxuri*, *Arctictis* is omnivorous, living on small mammals, birds, fishes, earthworms, insects, and fruits; it is also nocturnal and arboreal, its power of climbing about trees being much aided by its prehensile tail. It is rather slow in its movements. Its ability to suspend itself by its tail has been questioned, but Blyth has shown (J. A. S. B. xvi, p. 864) that the young at all events can support itself by the extremity of the tail alone. Blyth also remarks that it is the only known placental mammal with a truly prehensile tail in the Old World.

This species inhabits wild forests, and, owing to its nocturnal and retiring habits, is seldom seen; it is said, however, to have a loud howl. It is naturally fierce, but when taken young is easily tamed, and becomes very gentle and playful. Of its breeding nothing appears to be known.

The only remaining member of the *Viverrinæ* found in South-eastern Asia that requires notice here is *Cynogale bennetti*, a remarkable aquatic type, somewhat resembling an otter in form. It is of a red-brown colour, with the feet webbed, and rather less naked beneath than in *Paradoxurus*, and a short tail. The teeth have long and sharp cusps, adapted for capturing fish, on which it lives. It is found in the Malay Peninsula (J. A. S. B. xv, p. 203), Sumatra, and Borneo.

Subfamily HERPESTINÆ.

Besides the characters already enumerated, most of the members of this subfamily present the peculiarity of the anus opening into a sac-like depression; but this character is ill-marked or absent in some of the common Indian species. There are several genera included, but all except one are peculiar to Africa or Madagascar. The only generic type within the Indian area is *Herpestes*, the various subdivisions, such as *Urva*, *Tæniogale*, &c., raised to generic rank by Hodgson, Gray, and others, not being distinguished by characters of more than specific importance.

Genus HERPESTES, Illiger, 1811.

Syn. *Mangusta*, Olivier?; *Ichneumon*, Lacép. *nec* L.; *Mungos*, Ogilby; *Urva*, *Mesobema*, Hodgson; *Osmetectis*, *Calogale*, *Galerella*, *Galictis*, *Tæniogale*, *Onychogale*, Gray.

Body long and slender, limbs short, muzzle pointed. Ears very short and rounded. Tail, in most species, long and conical, being

generally thick at the base, and covered with long hair. The feet are plantigrade, the extent to which the under surfaces of the tarsus and carpus are naked varying in different species, extending in some to the heel in the hind feet, whilst in others the proximal portion of the tarsus is hairy below. The fur is coarse, and the longer hairs ringed or annulated, that is marked with alternating dark and pale spaces. Toes five on all feet. Mammæ usually 3 pairs, but occasionally 2. In several species, and probably in all, there are anal glands.

Dentition: i. $\frac{3}{3}$, c. $\frac{1-1}{1-1}$, p. $\frac{4-4}{4-4}$, m. $\frac{2-2}{2-2}$. Teeth of the molar series with strong, sharply-pointed cusps. Vertebræ: C. 7, D. 13, L. 7, S. 3, C. 21–29. The bony orbits in the skull are, as a rule, complete in adults, in which there is a considerable contraction in the

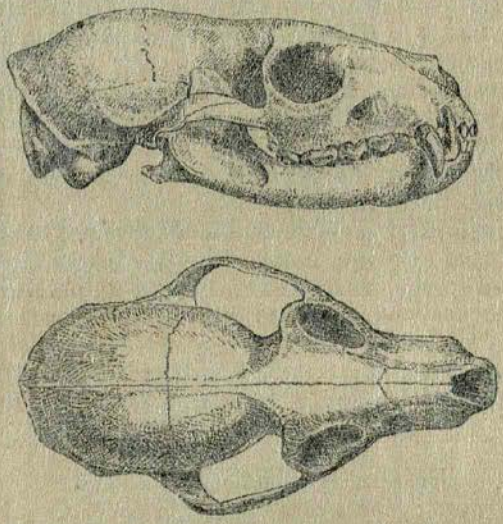

Fig. 34.—Skull of *Herpestes vitticollis*.

breadth of the cranium behind the long postorbital processes. This is much less conspicuous in young skulls. The brain-case behind the postorbital process is very long when compared with the muzzle. The bony palate is continued above the posterior nares for a long distance behind the molars; the pterygoid bones are very short, and there is no true pterygoid fossa, the pterygoid process of the alisphenoid forming a short, broad fossa that terminates posteriorly just at the posterior opening of the alisphenoid canal, close to the anterior extremity of the pterygoid itself.

Some of the species of this genus are African, one, *H. ichneumon*, extending to Spain; others are Indian. The African have been recently revised by Mr. Oldfield Thomas (P. Z. S. 1882, p. 64); the Oriental by Dr. Anderson, in his 'Anatomical and Zoological Researches.' I entirely agree with the latter in his generic views;

but I am induced to carry the reduction of the number of species a little further than he does.

The Mungooses are terrestrial animals, seeking their prey on the ground, and very rarely climbing trees. They are active, bold, and predaceous, and live on small animals, mammals, birds, and reptiles, insects and eggs, occasionally eating fruit. They are deadly enemies to snakes, as described under *H. mungo*. They live in holes in the ground, hollow trees, and similar places. When angry or excited, they erect their long hairs, and especially those of the tail.

Synopsis of Indian, Ceylonese, and Burmese Species.

A. No neck-stripe nor black tail-tip.
  a. Fur close and short, longer hairs of back with 4 or 5 rings of colour: size small.
    a'. Tarsus and hind foot without claws, under 2 inches long ..... *H. auropunctatus*, p. 121.
    b'. Tarsus and hind foot without claws, more than 2 inches ..... *H. birmanicus*, p. 122.
  b. Fur longer, long hairs of back with more than 5 rings; size larger.
    a'. Naked sole extending to heel. Colour grey or rufous ..... *H. mungo*, p. 123.
    b'. Naked sole not extending to heel.
      a''. Size large; tarsus and hind foot about 3 inches. Colour dark brown grizzled ..... *H. fuscus*, p. 127.
      b''. Size smaller; tarsus and hind foot under 2·7 inches. Colour dark brown or rufous ..... *H. fulvescens*, p. 127.
B. A black tail-tip, no neck-stripe ..... *H. smithi*, p. 126.
C. A black tail-tip and black neck-stripe ... *H. vitticollis*, p. 128.
D. No black tail-tip, a white neck-stripe ..... *H. urva*, p. 129.

58. Herpestes auropunctatus. *The small Indian Mungoose.*

Mangusta auropunctata, *Hodgs. J. A. S. B.* v, p. 235 (1836).
Herpestes nipalensis, *Gray, Charlesworth's Mag. N. H.* i, p. 578 (1837); *Jerdon, Mam.* p. 136.
Herpestes pallipes, *Blyth, J. A. S. B.* xiv, p. 346 (1845); xv, p. 169.
Herpestes persicus, *Gray, P. Z. S.* 1864, p. 554; *W. Blanf. P. Z. S.* 1874, p. 662; *Anderson, An. Zool. Res.* p. 174.
Herpestes auropunctatus, *Anderson, ibid.* p. 172.

Mush-i-Khourma, Persian; *Nûl*, Kashmir.

Size small. Fur short, even, close, moderately harsh, that of the tail considerably longer than that of the body. Tail, without hairs at end, about three quarters the length of the head and body. Naked sole not extending to the heel.

In the skull the pterygoid bones are not parallel, but diverge slightly behind.

Colour. Varying from light grey to dusky brown, minutely speckled with white or yellow. Lower parts paler and more uni-

form, or in western varieties white, and without any annulation on the hair. Dorsal fur brown at the base, then for some distance pale brownish grey or yellow, the longer hairs beyond this are blackish brown, then very pale brown or white, and, in some cases, tipped dark. Hairs of the tail with 5 to 7 alternations of pale and dark. There is some difference in the extent to which the pale and dark rings are developed; in very dark specimens the pale rings are greatly reduced in size and *vice versâ*.

Dimensions. Head and body 10 to 12 inches, tail, without hair at end, 7 to 10, tarsus and hind foot without claws 1·7 to 1·9; weight of a large male 18 ounces. A male skull measures 2·3 inches in basal length, 1·15 broad across zygomata.

Distribution. Throughout Northern India, being found in the lower Himalayas from Sikhim to Kashmir, in the North-west Provinces, Punjab, Sind, Baluchistan, South Afghanistan, and Southern Persia. To the eastward common in Lower Bengal about Calcutta, and found at Midnapur, but not recorded further south in the Peninsula. This species is found at Chittagong, and ranges through Cachar and Assam to Upper Burma, where it was procured by Anderson at Bhamo. It has not been found in Arakan, Pegu, or Tenasserim, but a single specimen, possibly imported, was obtained by Cantor in the Malay Peninsula. This is now in the British Museum, and is undistinguishable from Indian specimens.

Varieties. The Western form, found in Sind, Baluchistan, and Southern Persia, is very much paler and greyer in colour than Bengal and Himalayan skins usually are, and was distinguished by Blyth as *H. pallipes*, and by Gray subsequently as *H. persicus*. This was formerly classed separately by Anderson and myself. As, however, every intermediate gradation in colour can be found, I do not think the distinction can be maintained. The pterygoids in the skull of the pale-coloured variety are closer together anteriorly, and diverge more behind; but I can find no other difference, the discrepancies in breadth of the skull noticed by Anderson not being constant.

Habits. Nothing particular appears to have been recorded about this form, which is an active, inquisitive little animal, frequently seen in the daytime about bushes, hedgerows, and cultivated fields. The habits, so far as known, resemble those of *H. mungo*.

59. Herpestes birmanicus. *The small Burmese Mungoose.*

Herpestes auropunctatus birmanicus, *Thomas, A. M. N. H.* ser. 5, xvii, p. 84 (1886); *id. P. Z. S.* 1886, p. 58.

Size larger than that of *H. auropunctatus*, which this species resembles in the short, even fur and in structure generally. In the skull, the termination of the bony palate above the posterior nares is concave, and the pterygoids do not diverge.

Colour. Dark brown, minutely speckled with grey or yellowish grey throughout, lower parts very little paler than upper. Under-

fur dark brown at the base, then whitish, the longer hairs beyond this on the back are black, then comes a yellowish ring, and the tip is black. The black tips are only found on the upper parts. On the tail-hairs the alternations of colour are more numerous.

Dimensions. Skins measure: head and body about 14 or 15 inches, tail with hair 9 or 10, tarsus and hind foot 2·2. No measurements of fresh specimens are available. The skull of a male is 2·6 inches long to the back of the occipital condyles, 1·32 broad across the zygomatic arches.

Distribution. There are in the British Museum two specimens from Burma, one collected by Captain Wardlaw Ramsay, the other obtained by Mr. Oates in Pegu: a third specimen was collected by Mr. Hume in Manipur. I have also a skin from Cachar. This species probably replaces *H. auropunctatus* in Burma and some of the other countries east of the Bay of Bengal.

60. Herpestes mungo. *The common Indian Mungoose.*

Viverra mungo, *Gmel. Syst. Nat.* i, p. 84 (1788).
Herpestes frederici, *Desm. Dict. Sc. Nat.* xxix, p. 60 (1823).
Herpestes malaccensis, *Fischer, Syn. Mam.* p. 164 (1829); *Blyth, Cat.* p. 51; *Jerdon, Mam.* p. 134.
Mangusta (Herpestes) nyula, *Hodgson, J. A. S. B.* v, p. 236 (1836).
Mangusta mungos, *Elliot, Mad. Jour. L. S.* x, p. 102.
Herpestes pallidus, *Wagner, Schreb. Säugeth. Supp.* ii, p. 311, pl. cxvi c; *Anderson, An. Zool. Res.* p. 181.
Herpestes griseus, *Kelaart, Prod.* p. 41; *Blyth, Cat.* p. 51; *Jerdon, Mam.* p. 132; *Stoliczka, J. A. S. B.* xli, pt. 2, p. 227; *Thomas, P. Z. S.* 1886, p. 56, note; *nec* Ichneumon griseus, *Geoffr.*
Herpestes ferrugineus, *W. Blanf. P. Z. S.* 1874, p. 661, pl. lxxxi.
Herpestes andersoni, *Murray, Vertebrate Zoology of Sind*, p. 34 (1884).
Herpestes mungo, *W. Blanf. P. Z. S.* 1887, p. 631.

Newal, Newala, Nyul, or *Newar, Dhor, Rasu,* H.; *Mangús,* in the Deccan and Southern India; *Binguidaro, Sarambumbui,* Ho Kol; *Koral,* Gond.; *Mungli,* Can.; *Mangisu, Yentawa,* Tel.; *Kiri* or *Kiripilai,* Tam.; *Kiri,* Mal.; *Mugatea,* Cing.

Hair long and somewhat ragged. Tail, without hair, a little shorter than the head and body. Tarsus naked to the heel, the hinder part of the naked sole narrow.

In adult skulls the orbit is complete behind. The bony palate extends above the posterior nares to about half the distance between the last molars and the posterior end of the pterygoids. Pterygoids parallel, not divergent.

Colour. Greyish brown, speckled with white or pale grey, sometimes with a ferruginous tinge on the head and feet. A variety is ferruginous throughout. Lower parts paler. Underfur light brown, longer hairs distinct in colour from the underfur, and marked by alternating rings of white or greyish white and dark brown, 4 or 5 of each on the hairs of the back. The dark and light rings are generally of nearly equal length, but occasionally the pale

rings are longer than the dark. The tips are often rufous brown. Claws dark brown.

Dimensions. Head and body 15 to 18 inches, tail 14 to 15; weight about 3 pounds. Males are considerably larger than females. A large skull, probably male, is 3 inches in basal length, and 1·65 in breadth across the zygomatic arches, whilst a small adult female skull measures only 2·7 inches by 1·5.

Distribution. Found throughout the peninsula of India, from the Himalayas to Cape Comorin, and also in Ceylon. *H. mungo* ranges on the west to Sind and Afghanistan, and doubtless into Baluchistan. I have a specimen of a peculiarly pale colour with very long hair from Hazára, west of Kashmir, but this species is not known to be found on the Himalayas at any elevation further east, though common near the foot of the hills. It occurs throughout Bengal, and is said to be found in Assam; but it has not been observed in Burma, and the single specimen obtained by Cantor in the Malay Peninsula may very probably have been imported, whilst the original derivation of Cuvier's type of *H. malaccensis* from Malacca is very doubtful.

Varieties. Blyth and Jerdon distinguished the Bengal race as *H. malaccensis*. This is generally darker in colour, with the head and legs more rufous, but some Bengal specimens are similar to those from Southern India, and there appears to be no constant distinction, either in colour or size. A richly ferruginous form is found in Sind, besides the common grey type, and is a well-marked variety. On account of the coloration and some apparent differences in the skull, I distinguished this as *H. ferrugineus*, but the skull characters appear due to immaturity. A very large, old example of this ferruginous variety is the type of Mr. Murray's *H. andersoni*, which he has very obligingly sent to me for comparison.

Habits. The common mungoose is found in hedgerows, thickets, groves of trees, cultivated fields, banks of streams, and broken bushy ground, but not commonly in dense forest. It is often found about houses. It lives and breeds in holes dug by itself. Very little appears to be known of its breeding-habits. It is often seen in pairs; the young are three or four in number, and are produced in the spring.

The food of this animal is varied. It lives principally upon rats and mice, snakes and lizards, such birds as it can capture, eggs and insects, but it eats fruit at times. The stomach of one killed near Secunderabad contained, according to McMaster, a quail, a small wasp's nest, a lizard (*Calotes versicolor*), a number of insects, and part of a custard apple. The mungoose is sanguinary and destructive, and when it gains access to tame rabbits, poultry, or pigeons, it, Jerdon says, "commits great havoc, sucking the blood only of several." He adds, "I have often seen it make a dash into a veraudah where some cages of mynahs, parrakeets, &c. were daily placed, and endeavour to tear them from their cages."

The mungoose is easily tamed and becomes thoroughly domesti-

cated, very much attached to its owner, intelligent and amusing. An excellent account is given by Sterndale (Nat. Hist. Ind. Mam. p. 223) of one that he had tame, and that died of grief when separated for a time from its master. The itinerant showmen, who are common throughout India, are frequently accompanied by a tame mungoose, and most of the fights between these animals and snakes that are witnessed by Europeans are waged by such tame individuals. As is so commonly the case, a tame mungoose will doubtless attack a much more formidable opponent than a wild one would. Sterndale's mungoose once attacked a greyhound, and mortally injured a male bustard, *Eupodotis edwardsi*, a bird about six times the weight of its assailant.

Much has been written about the combats between this animal and venomous snakes, and about the immunity of the mungoose from the effects of the serpent's bite. The prevalent belief throughout oriental countries is, that the mungoose, when bitten, seeks for an antidote, a herb or a root known in India as *manguswail*. It is scarcely necessary to say that the story is destitute of foundation. There is, however, another view supported by some evidence, that the mungoose is less susceptible to snake-poison than other animals. The mungoose is not always willing to attack, though at other times he is ready enough to fight. I have not seen many combats, but so far as I can judge from the few I have witnessed, Jerdon and Sterndale are correct in their view that the mungoose usually escapes being bitten by his wonderful activity. He appears to wait until the snake makes a dart at him, and then suddenly pounces on the reptile's head, and crunches it to pieces. I have seen a mungoose eat up the head and poison-glands of a large cobra, so the poison must be harmless to the mucous membrane of the former animal. When excited, the mungoose erects its long stiff hair, and it must be very difficult for a snake to drive its fangs through this, and through the thick skin which all kinds of *Herpestes* possess. In all probability a mungoose is very rarely scratched by the fangs, and, if he is, very little poison can be injected. It has been repeatedly proved by experiment that a mungoose can be killed, like any other animal, if properly bitten by a venomous snake, though even in this case the effects appear to be produced after a longer period than with other mammals of the same size.

The mungoose is an excellent ratter, soon clearing a house of rats and mice. A tame individual in London is said to have killed, on one occasion, a dozen full-grown rats in less than a minute and a half. Within the last fifteen years the introduction of *H. mungo* into Jamaica is said to have resulted in a saving of from £100,000 to £150,000 annually, owing to the decreased number of the rats which destroy the sugar-canes (P. Z. S. 1882, p. 712).

The cry of this mungoose, according to Sterndale, is a grating mew, varied occasionally by a little querulous yelp, which seems to be given in an interrogative mood, when the animal is searching for anything; when angry it growls most audibly for so small a

beast, and the growling is generally accompanied by a bristling of the hair, especially of the tail. It is cleanly in its habits, and, after feeding, picks its teeth with its claws, a habit that has been noticed by more than one observer.

The name *H. griseus*, adopted by many authors for this species, is taken from Geoffroy's *Ichneumon griseus*, which does not, I think, belong to the Indian animal at all; whilst Gmelin's name, derived from the *Mungos* or *Viverra mungos* of Kaempfer and Linnæus, clearly by its name and description was intended for the common Indian mungoose, and has priority by more than twenty years.

61. Herpestes smithi. *The ruddy Mungoose.*

Herpestes smithii, *Gray, Charlesworth's Mag. Nat. Hist.* i, p. 578 (1837); *id. P. Z. S.* 1851, p. 131, pl. xxx; *Blyth, Cat.* p. 50; *Jerdon, Mam.* p. 135; *Anderson, An. Zool. Res.* p. 176.

Herpestes thysanurus, *Wagner, Münch. Gel. Anz.* ix, p. 440 (1839); *Schreb. Säugeth. Supp.* ii, p. 301.

Crossarchus rubiginosus, *Wagner, Schreb. Säugeth. Supp.* ii. p. 329.

Herpestes ellioti, *Blyth, J. A. S. B.* xx, p. 162.

Herpestes rubiginosus, *Kelaart, Prod.* p. 43.

Herpestes jerdonii *and* Calictis smithii, *Gray, P. Z. S.* 1864, pp. 550, 565.

Herpestes monticolus, *Jerdon, Mam.* p. 135.

Konda yentava, Tel.; *Erima-kiri-pilai*, Tam.; *Dito*, Cing.

Fur long, harsh, and rather ragged. Tail nearly as long as the head and body, or, including the terminal hair, longer. Naked sole beneath tarsus extending nearly to the heel but not quite.

Skull differing but little from that of *H. mungo*, except that the mesopterygoid fossa is narrower, and the pterygoids diverge slightly behind. The teeth are a little larger.

Colour. Varying from light brownish grey speckled with white as in *H. mungo*, to rufous or iron-grey, a mixture of black, ferruginous red, and white. The terminal portion of the tail, 3 or 4 inches long, jet-black, passing into ferruginous proximally, remainder of the tail concolorous with the body. Feet generally darker, rufous brown or blackish. Lower parts sometimes paler than back. Underfur grey to greyish brown, longer hairs with alternations of white and dark brown or black, usually four rings of each; tip from light brown to deep ferruginous, almost blood-red.

Dimensions. Head and body about 20 inches, tail 19. Some measurements are smaller. A male skull measures 3 inches in basal length, and 1·7 broad across the zygomatic arches.

Distribution. This species has a wide range in India, being found throughout the peninsula and Ceylon. Jerdon obtained it near Madras, near Nellore, and at the foot of the Nilgiris; Col. McMaster at Gawilgurh, Berar. Mr. Ball found it in Singhbhoom; I procured what I believe was this species in the Rájpipla hills east of Surat; there is a skin in Mr. Hume's collection from Sámbhur in Rájputána; and the type of *H. thysanurus*, which is

probably the same, was a Kashmir specimen. This form has not, however, been met with in the North-west Provinces or Bengal.

Varieties. The type of *H. smithi* is a very rufous skin, whilst that of *H. jerdoni* is almost as grey as *H. mungo*. But there is much variation, and in this as in other species the amount of rufous coloration is evidently very variable. The skulls are precisely similar. The measurements also show a remarkable variation, and it is just possible that a larger and a smaller form are confounded.

Habits. Very little has been recorded. The ruddy mungoose is chiefly found in thick forests.

62. Herpestes fuscus. *The Nilgiri brown Mungoose.*

Herpestes fuscus, *Waterhouse, P. Z. S.* 1838, p. 55; *Jerdon, Mam.* p. 136; *Anderson, An. Zool. Res.* p. 184, pl. viii, figs. 1, 2 (skull).

Size large. Tail a little shorter than the head and body. Hair on the tail longer than on the body. Fur long, not very harsh; underfur dense, long and woolly. Naked sole not extending to the heel.

In the only skull examined the orbit is nearly perfect. The pterygoid bones are parallel and peculiarly everted, being convex inside and concave externally. The second and third upper premolars with distinct anterior cusps. Last lower molar with three anterior cusps instead of two.

Colour. Blackish brown, minutely speckled with yellow or brownish white. Tail rather darker. Feet very dark. Underfur hair-brown, longer hairs with alternating rings of blackish brown and yellow or yellowish white, three or four of each, the dark rings much longer than the light.

Dimensions. Head and body 18 inches, tail with the hair at end 17; basal length of skull 3·2, zygomatic breadth 1·95.

Distribution. The Nilgiri and Travancore hills, and probably some other hill-ranges of Southern India. Anderson adds Ceylon, but without giving any authority, and I feel doubtful whether *H. fuscus* is found there, for it appears to be replaced by *H. fulvescens*.

Habits. Very little is known of this fine mungoose except that it inhabits the dense woods upon the Nilgiri hills, where it was obtained by Jerdon. It was procured in Travancore by Mr. Baker (J. A. S. B. xxviii, p. 283).

63. Herpestes fulvescens. *The Ceylon brown Mungoose.*

Herpestes fulvescens, *Kelaart, J. A. S. B.* xx, p. 162 (1851), xxi, p. 348; *id. Cat.* p. 52.
Herpestes flavidens, *Kelaart, J. A. S. B.* xx, p. 184; *id. Prod.* p. 44.
Cynictis maccarthiæ, *Gray, P. Z. S.* 1851, p. 131, pl. xxxi.
Onychogale maccarthiæ, *Gray, P. Z. S.* 1864, p. 570.
Herpestes maccarthiæ, *Anderson, An. Zool. Res.* p. 178.
Herpestes ceylanicus, *H. Nevill, Taprobanian*, i, p. 62.
Ram-mugatea, Cing.