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Size of a small *H. mungo.* Naked sole not extending to the heel. Tail without the hair at the end about three quarters the length of the head and body. Fur less harsh than in most species of the genus, long, with a thick woolly underfur; hair of tail but little longer than that of body.

In the skull the orbit is imperfect (apparently from immaturity, however), and the pterygoid bones parallel.

Colour. Normally dark brown speckled with dull yellow, but some specimens are paler. Lower parts nearly as dark as upper; feet dusky. Tail the same colour as the body. Underfur brownish grey, darker near the body, the longer hairs of the back with alternating rings of pale brownish yellow and dark brown, three or four of each, the basal and terminal rings pale. Claws brown.

Dimensions. Head and body $16\frac{1}{2}$ inches, tail $12\frac{1}{4}$. The skull measures 2.7 inches in basal length, and 1.45 in zygomatic breadth.

Distribution. Peculiar to Ceylon. Kelaart's specimens were from the hill-region to the south; Gray's type was said to be from Jaffna, but had evidently been kept in confinement.

Kelaart's two names fully scenes and flavidens were published in a paper read before the Asiatic Society of Bengal, March 5th, 1851 (J. A. S. B. xx, p. 287). The former occurs first, and is in every way preferable. Gray's name maccarthiæ was given in a paper read before the Zoological Society of London, May 13, 1851. It is clear that Kelaart's name is the earlier. Gray at first referred the species to Cynictis, a South-African genus of Herpestinæ with but four toes on each hind foot, and subsequently made H.maccarthiæinto a special genus Onychogale, apparently on account of its long fore claws, a character which, as Anderson has pointed out, was entirely due to the type having been kept in confinement.

Some skins are paler and more rufous than others, and one in the British Museum is pale sandy. The normal colour is very similar to that of H. *javanicus*, which may be distinguished by its shorter tail. H. *falvescens* is closely allied to H. *fuscus*, which it appears to represent in Ceylon, and from which it is chiefly distinguished by its much smaller size.

64. Herpestes vitticollis. The stripe-necked Mungoose.

Herpestes viticollis, Bennett, P. Z. S. 1835, p. 67; Ke'aart, Prod. p. 42; Jerdon, Mam p. 137; Anderson, An. Zool. Res. p. 188, pl. ix, figs. 3, 4 (skull).

Mangusta vitticollis, Elliot, Mad. Jour. L. S. x, p. 103, with coloured plate.

Loko-mugatea, Cingalese.

This is the largest species found in Asia. Tail, including the long hair at the end, about three quarters the length of the head and body, without the terminal hair about three fifths. The fur long and harsh, that on the tail longest. Sole of the hind foot naked to the heel.

In the skull the bony palate runs far back, considerably more than half the distance between the posterior upper molars and the

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and of the pterygoids, which diverge slightly. Teeth large, the hindmost upper and lower molars broader in proportion than in any other Indian species.

Colour. Varying from grizzled dusky iron-grey to rich unspeckled ferruginous or chestnut-red, the red colour being frequently confined to the hinder part of the body and tail, the head always iron-grey above. A black band down each side of the neck from behind the ear to the shoulder, with a paler or more rufous area above and below the band. Legs and feet unspeckled dark brown or black, and a long black tip to the tail. Fur brown at the base, the longer hairs with alternating rings of pale yellowish grey and black, 3 or 4 of each, the dark rings the longer, or there are one or two rings of each colour near the base of the hairs and all the terminal portion is ferruginous.

Dimensions. Head and body 21 inches; tail without hair at end about 13, with it 15; weight 6 lb. 10 oz. Basal length of skull 3.7 inches, zygomatic breadth 2.2.

Distribution. The hills near the west coast of India, from near Bombay to Cape Comorin, and Ceylon. Ceylon specimens appear more rufous than Indian.

Habits. But little known. Jerdon remarks that from its size, this species must be very destructive to game and the smaller quadrupeds. It is often seen on the Nilgiris, and appears abroad at all hours in the day, according to McMaster, who once observed a pair evidently hunting on scent, which they followed to earth, and they then began to burrow. Suddenly they started off at full pace in pursuit of something, probably, McMaster suggests, a hare, which had bolted from another opening of the burrow.

65. Herpestes urva. The crab-eating Mungoose.

Gulo urva, Hodgson, J. A. S. B. v, p. 238 (1836).

Urva cancrivora, Hodgs. J. A. S. B. vi, pp. 561, 564; Jerdon, Mam. p. 138.

Mesobema cancrivora, Hodys. J. A. S. B. x, p. 910; Calc. Journ. N. H. ii. p. 214.

Herpestes urva, Anderson, An. Zool. Res. p. 189, pl. ix, figs. 5, 6, skull. Arva, Nepalese.

Size large, approaching that of *H. vitticollis*. Form more robust than in most species of the genus. Tail about two thirds the length of the head and body. Fur of body and tail very long, coarse and ragged, underfur woolly. Naked sole of hind foot only extending about two thirds the distance to the heel. Mammæ 6, ventral. Two anal glands, one on each side, with external orifices.

In the skull the orbit is probably complete in old specimens. The termination of the bony palate above the posterior nares is concave.

Colour. Dusky iron-grey, or blackish with a greyish surface caused by the long whitish tips to the hairs. A well-marked

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narrow white stripe runs along each side of the neck from the angle of the mouth to the shoulder. Head dark brown, speckled with white; legs and feet the same, but without any white, the feet often black. The woolly underfur dark brown at the base, then pale brownish yellow, the longer hairs brown close to the skin, then light brown or yellowish brown like the underfur for a considerable length, next black, also for a long distance, and whitish at the tips.



Fig. 35.-Herpestes urva.

Dimensions. Head and body 18 to 21 inches; tail without the hair at the end 11 to 12; weight (of a small specimen apparently) 4 pounds. A skull measures 3.3 inches in basal length and 2 in zygomatic breadth.

Distribution. The south-eastern Himalayas at low elevations, Assam, Arakan, Pegu, Tenasserim, and Southern China.

Habits. The heavy form of this mungoose is probably connected with somewhat different habits from those of the typical species, such as *H. mungo*. According to Hodgson *H. urva* is somewhat aquatic, and lives chiefly on frogs and crabs, which abound in the Himalayan and Burmese streams. Like other species, it lives in holes in the ground.

The anal glands are about the size of a cherry, and the animal has the power of squirting out a factid fluid from them backwards with great force. A description of these glands has been given by Dr. Campbell (J. A. S. B. vi, p. 565).

Two more species of the genus, *H. javanicus* and *H. brachyurus*, both of large size, are found in the Malay Peninsula and in some of the islands; whilst a third form, *H. semitorquatus*, is peculiar to Borneo. Some other Malay species have been described, but appear doubtfully distinct.



Family HYÆNIDÆ.

The last family of the *Æluroidea* that is found in the Indian area is represented by a single species, the common striped hyæna. But two other species exist, both African. All resemble dogs more than cats, but are more nearly related to the *Viverrida*, and especially to the Herpestine subfamily, than to either *Felidæ* or *Canida*.

The head in hyænas is large and slightly elongated, the tail moderate, limbs rather long; the hallux and pollex are wanting, the tarsus and metatarsus entirely hairy. The feet have a median or plantar pad and one to each digit. The animal is truly digitigrade. The claws are but slightly curved, strong, blunt, and nonretractile.

The skull is remarkable for the great development of the sagittal crest, serving for the attachment of the powerful temporal muscles. The zygomatic arches are very strong. The auditory bulla is inflated but not divided; the paroccipital process distinct; there is neither alisphenoid canal nor pterygoid fossa. The palate extends back but a short distance behind the posterior molars. The teeth are well developed, the upper sectorial being particularly large.

By most naturalists all living hyzenas have been classed as one genus, but some writers of late have distinguished the African spotted hyzena as *Crocuta*, on account of its having much smaller upper true molars with but one or two roots, less developed lower true molars, no mane, and some remarkable peculiarities about the female genital organs (Watson, P. Z. S. 1877, p. 369, 1881, p. 516; and Mivart, *ibid.* 1882, p. 198).

Genus HYÆNA, Brisson, 1756.

Dentition: i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{3-3}$, m. $\frac{1-1}{1-1}$. The outer incisors much larger than the inner, canines and premolars large. Upper sectorial teeth very large, formed of a distinctly trilobed blade and a moderately developed inner tubercle at the anterior extremity of the tooth. Upper molar small and placed transversely close to the hinder edge of the sectorial, as in cats. Lower sectorial consisting of but little more than the bilobed blade. Vertebræ; C. 7, D. 15, L. 5, S. 4, C. 19.

The anatomy of the hyæna has been described by Daubenton in Buffon's 'Histoire Naturelle,' vol. ix, p. 280.

Fossil species are numerous, and no less than five have been recognized in the Siwalik beds of the Punjab, besides one species of an allied genus, called *Lepthyana* by Lydekker. Remains of the African *H. crocuta* have been found in caves near Karnul, Madras.





Fig. 36.-Skull of Hyana striata. (Guide to the Galleries of Mammalia, British Museum.)

66. Hyæna striata. The striped Hyæna.

Hyæna striata, Zimm. Geog. Gesch. ii, p. 256 (1780) ; Blyth, Cat. p. 44 ; Jerdon, Mam. p. 118.

Lakar bagha, Lakar bágh or Lakra, Jhirak, Hondar, Harvágh, Taras, H. in various districts; Taras also Mahr. and Sindhi; Cherak, Sindhi; Aptar, Baluchi; Renhra, Gond; Hebar kula, Ho Kol; Derko Tud, Paharia of Rajmehal; Dhopre, Korku; Kirba and Kut-kirba, Can.; Dúmul gúndu, Korna gúndu, Tel.; kaluthai-korachi, Tam.

Tail about three sevenths the length of the body, and clothed with long hair. Hair of the median line on the neck and back long, forming a crest or mane. The hind legs considerably bent and shorter than the fore, the hind feet much smaller than the fore feet. A large post-anal glandular pouch receiving the secretions of the large anal scent-glands.

The upper true molar with three roots; lower true molar with an inner tubercle and a well-developed talon or heel.

Colour. Dirty grey, with narrow transverse tawny or blackish stripes on the body and legs.

Dimensions. Head and body $3\frac{1}{2}$ feet, tail with hair $1\frac{1}{2}$. Skull 8.5 inches in basal length, 6.4 broad across zygomatic arches. Weight of an adult 74 lbs.

Distribution. Throughout the Peninsula of India, rare in forests, abundant in hilly open country. It is very common throughout Central and North-western India, and extends through Southwestern Asia to Northern Africa. It has not been recorded from Ceylon or east of the Bay of Bengal, and is rare in Lower Bengal.

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Habits. The hyana is most common in the drier parts of India, and its chief haunts are rocky hills and deep ravines. I have on several occasions turned hyanas out of grass or bushes, and Jerdon notices having met with some in sugar-cane fields; but as a rule this animal remains in the daytime in caves amongst rocks, or in holes, dug by itself, in the sides of hills or of ravines.

It is a nocturnal animal, and although an occasional individual may be met with returning to its den in the early morning, its rambles are usually commenced after sunset and ended before sunrise. During the night it roams far and wide, and no tracks of wild animals are more common, in the countries where it is found, than its unmistakable footprints, very like a dog's in shape, but with the marks of the hind feet conspicuously smaller than those of the fore feet. Unlike the spotted hyana, the striped species appears to be solitary in its habits, and it is rare to meet with more than two together.

The principal food of the hyæna consists of the carcases of animals that have died of disease or been killed by beasts of prev. and very often it carries off portions of the body to its den. I once shot one that was carrying away the hind leg of a uilgai. The powerful jaws and large teeth are admirably adapted for crushing bones, which are consumed by hyænas, after the flesh has been picked off by vultures and jackals. Occasionally sheep or goats, and more often dogs, are carried off by hyænas, and the latter at all events are often taken alive to the animal's den. Jerdon relates an instance in which a small dog belonging to an officer at Dumoh was carried away, but procured alive the next day from a cave by some sepoys, who killed the hyæna. Fragments of bones are often found around a byæna's retreat, together with the peculiar dung of the animal, which dries into hard white balls, known as alba græca, chiefly composed of fragments of bone, and so indestructible that they have been found fossilized in caves that had been tenanted by extinct forms of these animals.

The hyæna is universally despised for its cowardice; despite its powerful teeth, it rarely attemps to defend itself. It is occasionally ridden down and speared, but unless the ground is peculiarly favourable for horses, it will give a good run before being killed, not on account of its speed, for it is easily caught by a good horse, but from the way it turns and doubles. As a rule, it shows no fight when brought to bay. McMaster, in his excellent Notes, relates an instance in which a hyæna, after being slightly wounded by a spear, was pursued by a game old Arab horse who had lost his rider, and who attempted to seize the hyæna with his teeth and to strike him with his fore foot, an attack that the hunted animal only acknowledged by tucking its tail tightly between its legs.

The cry of the striped hyæna is much less frequently heard than that of the spotted species in the countries inhabited by each respectively, nor are their calls the same, though there is some similarity between them, and both are peculiarly loud and disagreeable.



Hyænas are easily tamed if captured young, and become very docile and greatly attached to their masters.

The number of young in a litter is, I believe, 3 or 4, but about all points connected with the breeding more information is required. The period of gestation does not appear to have been observed.

CYNOIDEA.

Family CANIDÆ.

The Cynoidea, consisting of a single family, Canida, in which are included dogs, wolves, jackals, and foxes, form a group of Carnivores as easily recognized and as distinct as the *Felida*.

The head throughout the family is elongate, tail moderate, limbs fairly developed, and the feet truly digitigrade, with the pads similar in number and form to those in cats and hyænas. The print of a canine foot is very similar in shape to that of a hyæna's, both differs from a cat's in having the two middle toe-pads at a greater distance in advance of the other two, and in the whole foot being much longer in proportion to its breadth. Throughout the *Canidæ* there are four toes on the hind foot, except in some cases of domestic dogs, which have five, and all, except the African genus *Laycaon*, have five toes on the fore feet, the pollex being much shorter than the other digits and not reaching the ground. The claws are blunt, nearly straight, and non-retractile.

In the skull the muzzle is much lengthened, the postorbital processes are short, the auditory bulls inflated but not divided into two by septa; a paroccipital process is attached to the hinder part of each bulla, but projects behind. There is an alisphenoid canal, but only a rudimentary pterygoid fossa.

There are always four premolars on each side of each jaw. The upper sectorial consists of a stout blade, of which the anterior cusp is large, conical, and pointed backwards : the posterior cusp is in the form of a compressed ridge; the inner lobe is very small and placed quite at the fore part of the tooth. The first upper molar is large, and much broader than long, its outer border bicuspid; the second molar is of the same shape but smaller. The lower sectorial is a very large tooth, with a strong compressed bilobed blade, the hinder lobe the larger and more pointed, a small but distinct inner tubercle inside the posterior lobe of the blade, and a broad low tuberculated heel. The second lower molar is less than half the size of the first or sectorial; the third lower molar, when present, is quite small.

Clavicles exist but are rudimentary. The vertebral formula is C. 7, D. 13, L. 7, S. 3, C. 17-22.

The family has an almost world-wide distribution, and all the forms are so closely similar in all essential structural characters

that generic distinctions are founded on characters of less struc tural importance than in most families of Mammalia. For an account of the cranial and dental characters see Huxley, P. Z.S. 1880, p. 238.

The Canidæ are mostly carnivorous. Many are predatory, and several hunt in troops. Some feed on carrion, on insects, or, in part, on fruit. All have a very acute sense of smell, and both sight and hearing are highly developed.

Three Indian genera are recognized, and may be thus distinguished:

- A. A frontal sinus present; postorbital process smooth and convex above ; tail, including hair at end (in all Indian forms), less than half the length of the head and body.
 - a. Seven teeth in lower molar series CANIS. b. Six teeth in lower molar series CYON.
- B. No frontal sinus, postorbital process concave above; tail

more than half the length of the head and body VULPES.

Many fossil Canines are known. In the Siwalik beds of the Punjab a wolf. Canis cautleyi, and a fox, Vulpes curvipalatus, have been found, and also a species of the extinct genus Amphicyon, which was in some respects intermediate between dogs and bears.

Genus CANIS, Linn. (1766).

Syn. Lupus, Saccalius, Oxygous, Ham. Smith.

In this genus are comprised the wild wolves and jackals and domestic dogs, the latter being apparently the descendants of several different wild forms, amongst which the common wolf and the common jackal are two of the principal.

The dentition is i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{4-4}$, m. $\frac{2-2}{3-3}$. The teeth are powerful. The tail in all wild species forms a moderate brush, the hair being longer than on the body. The pupil is round. There are generally 10, more rarely 8, mammæ.

Synopsis of Indian, Ceylonese, and Burmese Species.

- A. Head and body about 3 feet 6 inches long; much

67. Canis lupus. The Wolf.

Canis lupus, L. Syst. Nat. ed. xii, i, p. 58 (1766); Hutton, J. A. S. B.

xiv, p. 345; Scully, P. Z. S. 1881, p. 201. Lupus laniger, Hodgs. Cale. Journ. N. H. vii, p. 474; Horsfield, A. M. N. H. ser. 2, xvi, p. 107 (1835); Blyth, J. A. S. B. xvi, pt. 2, p. 1176. Canis chanco, Gray, P. Z. S. 1863, p. 94.

Canis niger, Sclater, P. Z. S. 1874, p. 654, pl. lxxviii.

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Jáárg, Persian; Gárk, Balach.; Kharmá, Brahni; Rátnahán, Kashmir; Chángá, Tibetan.

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Size large. Tail with hair considerably less than half the length of the head and body, without hair about one third. Fur long and thick, with woolly underfur.

Colour. On the upper parts and the outside of the limbs rufous or yellowish grey, much mixed with black in some skins, lower parts whitish. Underfur on back pale slaty or light brown with coarse whitish hairs intermixed, longer hairs light brown tipped with black; sometimes beyond the black there is a white termination. The tail is often tipped with black. Some individuals are much paler than others, some are quite black.

Dimensions. Head and body 3 feet 6 inches to 3 feet 9 inches, tail without hair 15 to 16 inches, with hair 18 or 19, hind foot from heel 9, ear outside 4.5; height 2 feet 4 inches. A large skull measures 8.7 inches long in basal length, 5.5 broad across the zygomatic arches; a smaller but fully adult skull is 8 inches long, 4.8 broad.

Distribution. Throughout the Palaarctic region, extending into Baluchistan, and Western Sind (where a specimen has been obtained by Mr. J. Murray), and probably into the Northern Punjab, as a skull from the Salt Range, collected by Mr. Theobald and now in the British Museum, appears to belong to this and not to the next species. The common wolf, if, as I believe, *C. laniger* is identical, inhabits all countries north of the Himalayan range.

Varieties. The Sind, Baluchistan, and Gilgit animals appear undistinguishable from European wolves. The variety found in Tibet and Ladák is, however, very pale-coloured, with woolly fur, and has generally been distinguished as *C. laniger*. I thought at one time that the dentition was different, the upper sectorial in *C. laniger* being generally shorter than the two upper true molars taken together, whilst the reverse was believed to be the case in *C. lupus* (P. A. S. B. 1877, p. 116); but Huxley in his paper already quoted (p. 279) has shown that the teeth of both European and Tibetan wolves vary in this respect, and the difference in the fur appears due to climate. The cranial distinctions mentioned by Blyth (J. A. S. B. xxiii, p. 733) are probably caused by age. The black Tibetan wolf, classed apart by some, is evidently a variety similar to the black European wolf that was called *Canis lycaon* by Schreber.

Habits. The common wolf plays as large a part in story and myth amongst European nations as the tiger does in India. The wolf's habits are well known, though, as in the case of the great feline beasts of prey, the terror inspired by him has invested him, in popular lore, with many imaginary attributes.

Wolves are found both in open country and forests. As a rule they occur solitary or in pairs, but at times, and especially in the winter, they associate in packs, sometimes of large numbers. They live upon any mammals or birds that they can kill; they carry off children, sheep, and goats, and when pressed by hunger attack men. Horses and cattle are only killed when several wolves combine. Carrion is readily eaten by these animals, and in case of need they are said to feed upon vegetable substances, such as buds of trees, lichens, and moss.

Although wolves prey to a considerable extent by night, they are by no means exclusively nocturnal in their habits. Their principal cry is a loud howl, which serves as a call.

The pairing-time is from December to April, the period of gestation 63 days, so that the young, varying in number from four tonine, are born in the spring or early summer. Wolves breed in thickets or in holes in the ground. The whelps are not full-grown and capable of propagating until the third year after their birth. The duration of life is from 12 to 15 years. Young wolves are easily tamed.

68. Canis pallipes. The Indian Wolf.

Canis pallipes, Sykes, P. Z. S. 1831, p. 101; Blyth, Cat. p. 39; Jerdon, Mam. p. 189.

Canis lupus, Elliot, Madr. Journ. L. S. x, p. 101; Blyth, J. A. S. B. xi, p. 596.

Bheriya, Gúrg, Hondár, Nekra, Bighána, H.; Bagyár, Sindhi; Lándgá, Gond and Dakhini; Tola, Can.; Toralú, Tel.

Structure generally similar to that of *C. lupus*, but the animal is smaller and slighter, and the fur shorter, with little or no woolly underfur. Mamme 10.

Colour. Greyish fulvous, usually with a brownish tinge, sometimes much mixed with black on the back; some have a reddish tinge, and occasionally it is said that a thoroughly rufous individual is met with. All I have seen are, however, browner than *C. lupus* generally is, and of an earthy grey colour. Hair of varying shades of light brown from the base to near the end; tips black on the back. Coarse white hairs are mixed with the finer fur near the skin. The hairs on the tail have generally black tips. Lower parts dingy white. The young are sooty brown, with a milk-white chest-spot, which disappears about the sixth week from birth, when a dark collar appears below the neck, but is lost at maturity.

Dimensions. Head and body about 3 feet, tail with hair 16 to 17 inches. Skull of an adult male from Sámbhar 6.85 inches in basal length, 4.4 broad. Weight of a female 42 lbs.

Distribution. The Indian Peninsula south of the Himalayas, especially in open plain country; rare in wooded districts and amongst hills. I have never heard of this species occurring on the Malabar coast. Rare in Lower Bengal. Unknown further east: not found in the Himalaya, and apparently replaced by *C. lupus* beyond the Indus, though occasionally seen west of the river. No wolf has been recorded from Ceylon.

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Mabits. Very similar to those of C. lupus, except that the Indian wolf, although somewhat gregarious, is not known to associate in large packs (I have never heard of more than six to eight together). It is also rather a silent animal, but sometimes, Jerdon says, it barks like a pariah dog. It is rarely, if ever, heard to howl.

Indian wolves prey on all mammals or birds they can kill, but especially on sheep, goats, and antelopes. Instances are not rare of their attacking man, two or more combining for the purpose; and they, in some parts of India, carry away a large number of children yearly, usually taking them from villages. They course and run down hares and foxes, and occasionally attack cattle. They not unfrequently kill dogs.

Like all wild canines, these animals are very intelligent and cunning, and many of the stories told of the stratagems they employ to secure their prey appear to be well authenticated. One plan, vouched for by several observers, is that of part of the pack driving antelopes or gazelles across a spot where others of the pack are lying in ambush, either in ravines or in hollows scratched by themselves in the ground. Some wolves, too, are said to lie in wait hidden until antelopes approach them while feeding. A remarkable story is related by a writer in the 'Asian,' who states that he saw a wolf rolling on its back with its legs in the air, whilst some antelopes that were attracted to approach by curiosity advanced to within sixty or seventy yards; then they were accidentally disturbed, and two other wolves, that had been lying in ambush 100 yards apart in advance of the third, jumped up. It is also said that when wolves attack sheep, part of the pack attack and keep the dogs in check, whilst others carry off the prev.

A somewhat similar story is related by Forsyth, except that the victims were children. In the Dumoh district of the Central Provinces an old she-wolf and a full-grown cub haunted a patch of bushes and grass near a village standing on the slope of a hill, down which ran the main street, where children were always at play. The smaller wolf hid amongst bushes between the village and the bottom of the hill, whilst the larger animal went round to the top, and, watching its opportunity, ran down the street, carvying off a child on the way. At first the people used to pursue, and sometimes made the marander drop his prey; but in that case the companion wolf usually succeeded in carrying off another of the children in the confusion, whilst the child first seized was generally so injured as to be beyond recovery. In this, as in many other similar cases, a very wide-spread superstition prevented the villagers from hunting down and killing the animals ; and Forsyth actually found it difficult to get men to assist him in shooting the brutes, in which he fortunately succeeded.

The story illustrates both the cunning and the boldness of the Indian wolf. I myself saw one run out of a village in the middle of the day with a young goat and escape with it in spite of the villagers' pursuit. The great aversion to killing a welf that exists in many parts of India is due, I am told by Mr. Theobald, to a widely spread belief that the blood of a wolf, if shed upon the lands of a village, renders them unfruitful.

The Indian wolf has both speed and endurance, and has very rarely, if ever, been run down and speared from horseback, though the feat has often been attempted. McMaster, after briefly describing an unsuccessful attempt, very appropriately quotes *Byrow's* lines in 'Mazeppa' about wolves :---

> "With their long gallop, which can the The hound's deep hate and hunter's fire."

If hunted with greyhounds a wolf generally, after going for some distance, turns upon the dogs and chases them back to the huntsman. Instances of this are given by both Jerdon and Forsyth; but the latter relates how in one case a wolf that had chased back two greyhounds met his match in a bull mastiff. Jerdon states that a wolf once joined his greyhounds in hunting a fox.

In the Indian desert between Rájputána and Sind wolves are said by Sir B. Frere (Journ. R. Geogr. Soc. 1870, p. 204) to be dug or smoked out of their dens amongst the sand-hills. This is generally done about midday in the hottest part of the hot season; the men engaged protect their feet with folds of raw hide, and if the wolves are not clubbed or speared at once they are easily run down, as the hot sand blisters their feet and disables them.

I was told by Mr. Le Mesurier, formerly chief engineer of the Great Indian Peninsular Railway, that he succeeded in capturing many wolves in a pitfall consisting of a circular trench with perpendicular sides, and too deep for the animal to jump out of. On the ground left at the original level in the middle of the circular trench, a goat was tethered, and the trench was thinly covered with sticks and straw, that gave under the wolf's weight.

Indian wolves breed in holes or in caves among rocks. Dr. Bonavia, in a letter published in 'Nature' for 1875 (vol. xii, p. 67), states that the young vary in number from three to eight, and are born from October to December, chiefly in the latter month. He adds that they are born blind and with drooping ears. The young are easily tamed, and they have all the habits of dogs *; indeed, the common Indian dogs may be in part descended from wolves, although they are probably chiefly derived from jackals. There is some evidence to show that the Indian wolf occasionally breeds with the village dogs; whilst Sir B. Frere (Journ. R. Geogr. Soc. 1870, p. 205) mentions that in the Indian desert a pariah bitoh was known to associate with a pack of wolves.

Stories about wolf-reared children are common in Northern India, especially in Oudh. Particulars of several supposed cases

^{*} A curious instance may be mentioned. Dr. J. Anderson gave two young tame wolves a teal that was rather high. They would not eat it, but rolled over on it exactly as many dogs would do.

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were collected by Colonel Sleeman, and several are recorded by Sir E. Murchison (A. M. N. H. 2, viii, p. 153) and Mr. Ball (P. A. S. B. 1873, p. 128, and 'Jungle Life,' pp. 455-466). It is doubtful how far any are authentic. All the children were boys, and all appear to have been idiots.

69. Canis aureus. The Jackal.

Canis accens, Linn. Syst. Nat. i, p. 59 (1766); Elliot, Madr. Journ.
 L. S. x, p. 101; Blyth, Cat. p. 40; Jerston, Mam. p. 142.
 Canis aureus indicus, Hodgson, As. Res. xviii, p. 237.

Sacalius indicus and Oxygous indicus, Hodgs. J. A. S. B. x, p. 908.

Gidár, Siyál, or Shíál, Phiál, H.; Laraiya, Bandelkand; Shigal, Pers.; Srigala, Sanse.; Shál &, Sháaj Q, Kashmiri; Tolágh, Baluchi; Kolá, Mahr. and Dakh.; Karincha, Ho Kol; Kolial, Nerka, Gond.; Nari, Can.; Kalla-Nari, Tam.; Nakka, Tel.; Karaken, Nari, Mal.; Naria, Cing.; Amu, Bhot.; Hiyál, Assamese; Meshrong, Kachari; Hijai, Joksat, Mikir; Hian, Naga; Mye-khwe, Burm.

Tail with the hair at the end about one third the length of the head and body. As a rule, the upper sectorial is much shorter than the two true upper molars taken together; but in two out of twelve measurements given by Huxley the length is the same. Mamma 10.

Colour. Pale isabelline to pale rufous, more or less mixed with black on the upper parts; muzzle, ears, and outside of limbs more rufous; lower parts paler, sometimes nearly white; hair of the fore neck with dusky tips. The underfur on the back is brown, paler at the base, the longer hairs on the back beyond the underfur grey with black tips. The tail-hairs are reddish brown, with long black terminations, making a black tail-tip. Bright rufous, coal-black, and pure white albino individuals have also been recorded (Blyth, J. A. S. B. xxvii, p. 275).

Dimensions. Variable, some animals being much larger than others. The head and body certainly vary from 2 feet to 2 feet 6 inches in length, and I have seen measurements given of 2 feet 8 inches, though these must, I think, have been taken on skins. A large male from the Nipalese Terai measured: head and body 30 inches, tail without hair at the end 9, with hair 11, ear 3:2; weight 20 lbs. A small female from Rájputána measured: head and body 24:6, tail without hair 9, with hair 12:1, ear 3:2, hind foot from heel 5:5. Skulls are also very variable (see Huxley, P. Z. S. 1880, p. 277); a large one measures 5:8 inches in basal length and 3:5 in zygomatic breadth, an adult female 4:95 by 2:9.

Distribution. The jackal is found throughout the whole of India and Ceylon, on hills and plains, in forest and open country, and even in populous cities. It ascends the Himalayas to an elevation of 3000 or 4000 feet, and is occasionally found higher, especially around hill-stations, whilst it is common on the Nilgiris in Southern India. It is more rare east of the Bay of Bengal, but is found in Assam and Cachar, and is not uncommon at Akyab and about Thayet Myo in Northern Pegu. It has also recently been observed close to Mandalay. The only place where I have heard of its occurrence farther south or east is near Moulmain*, where Mr. Theobald tells me he once saw two; but it is possible these might have been introduced. West of India it extends throughout South-western Asia to the Caucasus, and is found in South-eastern Europe in Greece and Turkey, and as far west as Dalmatia, also throughout Northern Africa, being replaced by closely allied species in the Ethiopian region.

Habits. Jackals are found singly or two or more together, and they sometimes associate in considerable numbers, especially at night, as is shown by their howlings. They are principally nocturnal, more so, I think, than the Indian wolf, but by no means exclusively; in the cold season they may be seen about at all hours. Their food is very varied, consisting of carrien of all kinds, any beasts or birds that they can master, and, in default of animal food, fruit. The jackal is one of the common scavengers of towns and villages, feeding on offal or dead carcases of any kind, and occasionally killing poultry or even lambs or kids. "Sickly sheep and goats usually fall a prey to him, and a wounded antelope is pretty certain to be tracked and hunted to death by jackals" (Jerdon). Amongst fruits, he especially feeds on ber (Zizyphus), and he is said in several parts of India to be very fond of sugarcane and of maize. "In Wynaad, as well as in Ceylon, he devours considerable quantities of ripe coffee-berries ; the seeds pass through him, well pulped, and are found and picked up by the coolies; it is asserted that the seeds so found make the best coffee !" (Jerdon). As Sterndale explains, these seeds are the best because the jackals select the finest fruit.

The cry of the jackal is familiar to all who have ever resided in the countries inhabited by the animal, and consists of two parts—a long wailing howl three or four times repeated, each repetition in a note a little higher than the preceding, and then a succession of usually three quick yelps, also repeated two or three times. The common Anglo-Indian version of "Dead Hindoo; where, where, where," gives some idea of the call. In one African jackal, *C. variegatus* of Abyssinia, the second portion of the cry is entirely wanting.

There is, however, another, a very peculiar call, only uttered by the jackal, it is believed, when a tiger or leopard is in the neighbourhood, and certainly uttered upon such occasions. The cry is unmistakable, I have several times heard it; but the jackal that makes it carries us at once into the region of fable and folk-lore. The same story that has existed on the shores of the Mediterranean for two thousand years at least, that a jackal acts as scout for the

* There are, however, in the Leyden Museum two stuffed specimens of this animal collected by Diard, and one of them is labelled from Malacca, the others from Borneo. It is impossible to say whether the localities are correct. 142

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tion, or "lion's provider," and is repaid by a share of the prey, is commonly believed with regard to the tiger in India ; and it is this peculiar jackal, known as Phedl, or Phiou, or Phnew (see Torrens, J. A. S. B. xviii, p. 788) in Northern India, the name being taken from the ery, and as Bhálú or Kol bhálú in Southern and Western India, that is said to invariably precede the tiger and to make the call just noticed. Several observers have, however, remarked that the jackal which makes the cry follows the tiger and does not precede him; and Mr. Blyth has observed that a pariah dog, on sniffing a collection of caged tigers in Calcutta, set up a most extraordinary howl, probably similar to that of the Pheál. Jerdon gives an excellent abstract of the opinions expressed by various writers, and concludes, as others have done, that the cry is an alarm-note. This appears probable ; tigers, if they have an opportunity and are hungry, may kill and eat jackals, and leopards certainly do so.

Another belief, which appears widely diffused in India and Ceylon, is that a horn grows on the head of some jackals, and is of great virtue to its possessor.

The jackal is occasionally hunted by hounds, and gives a good run, but is quickly caught by greyhounds, who, however, cannot always dispose of him easily. He is, Jerdon says, very tenacious of life, and shams dead in a way to deceive even experienced sportsmen.

The period of gestation in the jackal is usually said to be sixtythree days, the same as in the wolf and dog; but, as might be expected, there is some variation, and there appears good reason for believing that the time in the jackal is a few days less * on an average. The number of young in a litter is about four; the female brings forth in holes in the ground, occasionally (as Jerdon remarks) in dry drains. That some breeds of domestic dogs, perhaps all the smaller races, are derived from jackals appears to be the opinion of most competent naturalists. The two breed together freely, and it is probable that some of the jackal-like dogs seen about Indian villages may be hybrids.

Jackals are liable to attacks of rabies, and mad animals are not uncommon, many cases of hydrophobia having resulted from their bites both in men and animals.

Genus CYON, Hodgson (1838).

Syn. Cuon, Hodgson; Chrysæus, Ham. Smith.

There are only two true molars on each side of the lower jaw, instead of three, as in *Canis*, the dentition being :---i. $\frac{6}{6}$ c. $\frac{1-1}{1-1}$,

^{*} The subject is fully discussed by Darwin ('Animals and Plants under Domestication,' i, p. 29). The question of the origin of domestic dogs is there treated at length.

pm. $\frac{4-4}{4-4}$, m. $\frac{2-2}{2-2}$. The muzzle is proportionally shorter, and the line of the face, when viewed from the side, is slightly convex, instead of being straight or concave as in other *Canida*.

The mammæ are more numerous, being 12 or 14 instead of 10. There is long hair between the foot-pads.

In all other respects the genus Cyon agrees with Canis. Cyon has a very peculiar geographical distribution, being found in Central Asia as far north as the Altai, the Amurland, and Sagalien, and throughout the Oriental region, but not, so far as is known, in Northern China or Japan.

There is some doubt about the specific characters, but two distinguishable forms appear to inhabit our area *.

Synopsis of Indian and Burmese Species.

Α.	Larger and stouter; hair long, with woolly	
	underfur, ferruginous red to tawny. Skull	
	675 to 7 inches long; tarsus and hind	CARLES AN REAL OF STREET
	foot over 7 inches	C. dukhunensis, p. 143.
B.	Smaller and slighter; hair short, no under-	的目的。這個的目的情況的目的自然的意思
	fur, brighter ferruginous. Skull 6.25 inches	1884年,在1989年,1989年,1989年,1989年 1989年———————————————————————————————————
	long, tarsus 6	C. rutilans, p. 147.

The term "wild dog" applied to these animals is clearly a misnomer, for in every important detail in which the genus *Cyon* differs from *Canis* (wolves and jackals)—in the form of the skull, the dentition, and the number of mammæ—domestic dogs agree with the latter and not with the former. The name has doubtless been applied to the present genus on account of its hunting in packs, like hounds, its fine handsome and bold appearance, and its courage.

A description of the anatomy of this genus is given by Dr. Murie (P. Z. S. 1872, p. 715). The anal glands have been described by Hodgson (Calc. Journ. N. H. ii, p. 412), and the skeleton by Dr. Campbell (*ibid.* p. 209). The strong and unpleasant odour of the animal, which resembles that of the jackal, appears due, in part, to the secretion from these glands.

70. Cyon dukhunensis. The Indian wild Dog.

Canis dukhunensis, Sykes, P.Z. S. 1831, p. 100, 1832, p. 15; Blyth, J. A. S. B. xi, p. 591.

Canis primævus, Hodgson, As. Res. xviii, pt. 2, p. 221 (1833), with figure.

* These were united by Blyth, Jerdon, Murie (P. Z. S. 1872, p. 720), and others, and I am by no means confident that the distinctions here pointed out are sufficiently constant to justify separation, but they are found in all the specimens I have been able to examine—seven or eight of *C. dukhunensis* or primævus, and four of *C. rutilans*.



Cuon primævus, Hodgs. A. M. N. H. i, p. 152 (1838); Cale. Journ. N. H. ii, pp. 208, 412; Adams, P. Z. S. 1858, p. 514.

? Cuon graviformis, Hodgs. Cat. Mam. &c. Nepal & Tibet B. M. 2nd ed. p. 5 (1863).

Cuon rutilans, Blyth, Cat. p. 37; Jerdon, Mam. p. 145 (nee Müller).

Son-kutta, Rám-kutta, Jangli, or Ban-kutta, H.; Kolsun, Kolasna, Kolasra, Kolsa, Mahr.; Eram-naiko, Gond.; Tani, Ho Kol; Vatai-karau, Tam.; Reza-Kútá, Adavi-Kútá, Tel.; Shin-nai, Mal.; Rám-hun, Kashmir; Siddaki, Ladák; Bhaosa, Bhúnsa, Buánsú, in the Himalayas from Simla to Nipal; Hazí, Phará, Tibetan; Paoho, Bhot.; Sa-túm, Lepcha.

The general form is rather that of the jackal than of the wolf, the legs being shorter than in the latter. Fur long, with thick woolly underfur in Tibetan and Himalayan skins. The tail is a good brush. General form stout. The upper sectorial is decidedly longer than the two upper true molars together.

Colour. On upper parts generally rusty red, varying in some specimens to rufous grey or even light brownish grey, paler below. The colour is generally not uniform, being variegated by dark tips to the dorsal hair. The underfur, when present, varies in colour from light brown to dull rufous on the upper parts, and has lightcoloured coarser hairs intermixed; the longer hairs are light rufous, with dark rusty-red tips. Terminal portion of tail black (very rarely the extreme end is whitish). The young animals are sooty brown throughout.

Dimensions. Head and body of a male 37.5 inches, tail without hair 8, with hair 14½, tarsus and hind foot $7\frac{5}{8}$; weight 27 lbs. (*Hodgson*). The animal had been in confinement and was very thin. A skull measures 6.5 inches in basal length, 4.2 in zygomatic breadth; length of upper sectorial 0.85.

Distribution. The Indian wild dog is found in Gilgit, Ladák, and other parts of the Upper Indus valley; it was obtained by Hodgson from Eastern Tibet, and it occurs throughout the Himalayan forests from Kashmir to Assam. It also inhabits all the larger forests of the Indian Peninsula, but I cannot find it recorded from Ceylon except by Jerdon, and he was perhaps misled by Hamilton Smith's *Chrysæus ceylanicus*, which appears to have been a domestic or semi-domestic dog. Kelaart distinctly denies the existence in Ceylon of the present animal.

It is doubtful whether the species found in the countries between Assam and Tenasserim is this or the next.

No Indian mammal has so remarkable a range as C. dukhunensis. Judging from other mammals, it might have been expected that the Tibetan and Himalayan species, C. primævus of Hodgson, would prove identical rather with the Siberian C. alpinus, Pallas, than with the Indian C. dukhunensis. But Scully has shown (P. Z. S. 1881, p. 202) that C. alpinus is distinguished by its much larger upper true molars, whilst no constant difference has hitherto been detected between C. primævus and C. dukhunensis.

Habits. The wild dog of the Indian Peninsula is a forest animal,

but in the Upper Indus valley and Tibet must inhabit open hilly country, as there is no forest. It is, as a rule, diarnal, but may move about by night also. It is thoroughly predatory, 'diving, as a rule, on the animals killed by itself and the associated members of the same pack; but probably, like other cardines, feeding upon carrion and on vegetable food at times. McMaster, to whom we are indebted for some very good notes on the species, found that an animal kept in confinement ate herbs, grass, and leaves of various kinds greedily, "not as dogs do where ill, but with a keen relish."

All forms of the genus Cyon hunt in packs, usually from six to twelve, but sometimes as many as twenty in number, and live principally upon deer of various kields and wild pigs in India, and on wild sheep and antelopes in Tibet. Many sambar and spotted deer are killed by them, whilst occasionally nilgai and Indian anelopes fall victims. Wild dogs avoid the neighbourhood of man, and consequently but rarely attack domestic animals; occasionally, however, they kill sheep, goats, and cattle, and Jerdon mentions one instance, and McMaster another, of their pulling down a tame buffalo. I came across a third case myself in the jungles east of Baroda, and I was curious to see how so large an animal had been destroyed. There were but a few tooth-marks about the nose and broat, and some of the pack had evidently attacked the buffalo in fromt, whilst others tore it open. This is probably their usual way of killing large animals; they have been seen to snap at the flank of a sambar running.

The statement made by Hodgson, apparently on native information, that wild dogs give tongue when hunting is denied by the excellent observer and sportsman Colonel Hamilton, who wrote under the name of "Hawkeye," and who is quoted by McMaster. I have twice met with these animals in the act of hunting, once on the Nilgiris and a second time east of Raipur in Chhatisgarh, and in neither case did I hear any sound. They are said, however, to howl at night.

Throughout India there is a general belief that these wild dogs hunt and kill tigers. Whilst not absolutely rejecting the tale, I must say that I think it improbable. The wild dog drives away all deer and other wild animals on which tigers feed, and probably the latter follow their prey. At the same time, some of the accounts of wild dogs attacking tigers are singularly circumstantial. Captain Baldwin, in 'The Large and Small Game of Bengal' (p. 19), gives the particulars of one case, apparently as well authenticated as an account can be that rests upon the evidence of villagers inhabiting wild parts of the country. In this case the remains of a tiger that had been devoured were said to have been found together with three dead wild dogs. The same writer (p. 108) describes an instance, said to have been witnessed by an English sportsman, of an attack by wild dogs on the Himalayan black bear (Ursus torquatus). Another case in which wild dogs a re asserted to have killed a tiger is mentioned by Mr. Sterndale in 'Seonee' and in his 'Natural History of Indian Mammalia.' In other instances the wild dogs are said to have disputed with a tiger or a leopard the possession of prey that had been killed by the latter. It is not improbable that such disputes occur, that they result in the death of some of the wild dogs, and that the remains of the bullock or sambar over which the contest has occurred are taken by credulous men for tiger's bones.

Another story about the wild dog, also universally believed in -India, and quoted by Hodgson and others as if perfectly authentic, is that the urine of these animals is excessively acrid, that they sprinkle with it the bushes through which they drive their prey, and then rush upon the latter when blinded by the pungent fluid. Another version is that they jerk the urine into their victim's wes with their tails. This is sometimes said to be their method of killing tigers, and in Burmah they are even supposed to destroy elephants by this stratagem. It is scarcely necessary to say that, except Hodgson, none of the neturalists (such as Jerdon, McMaster, and Sterndale) who mention this extraordinary story express any belief in it. A somewhat similar story (I suspect a myth) is told about wolves in Europe, and related by so good an observer as Blasius (' Säugethiere Deutschlands,' p. 182), to the effect that when large animals such as cattle or horses offer much resistance to wolves the latter dip their tails or the whole of their bodies in water, and either shake themselves before the animal they are attacking, or whisk their tails into his eyes and then rush on him in a body whilst his eyes are closed.

Although many large animals are killed by wild dogs, no instance appears to be known of their attacking man.

Wild dogs are said to be absolutely untamable, and, although this is perhaps an exaggeration, they are certainly very difficult to tame. In one instance mentioned by Hodgson there was a certain amount of domestication of a young individual, as it would play with dogs, and allow itself to be caressed by its owner, but others remained for years as fierce and shy as when caught, and this is the experience of all other writers.

The breeding-period is in the winter. The time of gestation is not accurately known, but is probably about two months; the young are produced in holes or caves among rocks from January to March, and there are sometimes six or more in a litter; but, according to Hodgson's observations, usually two to four. A breeding-place was discovered by Mr. Wilson near Simla, where soveral females apparently bred together.



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71. Cyon rutilans. The Malay wild Dog.

? Canis javanicus, Desm. Mamm. p. 198 (1820).

Canis familiaris, var. sumatrensis, Hardwicke, Trans. Linn. Soc. xiii, p. 235, pl. xxiii (1822).

Canis rutilans, S. Müll. Verhandelingen, Zool. Zoogd. pp. 27, 51 (1839); Blyth, Mam. Birds Burma, p. 24.

Cuon primævus, Cantor, J. A. S. B. xv. p. 196, nec Hodgson.

Tau-khwe, Burm. ; Anjing-utan, Malay.

Smaller and slighter in build than *C. dukhunensis*, limbs much more slender. The length of the upper sectorial is very little more than that of the two upper true molars. No woolly underfur; hair of body short and harsh; brush smaller than in *C. dukhunensis*.

Colour. Uniform deep ferruginous red above, hair scarcely paler towards the base. Lower parts whitish. Terminal portion of tail black. (The original *C. javanicus* was said to be black on the back and outside of the limbs.)

Dimensions. Head and body $32\frac{1}{2}$ inches in a young male, tail 12; tarsus and hind foot in adults 6 inches. An adult female skull from Moulmein measures 5.9 inches in basal length, 3.5 in zygomatic breadth, length of upper sectorial 0.75.

Distribution. Throughout the Malay Peninsula, Sumatra, Java, and it is said Borneo. This is the species found in the Tenasserim provinces; and there is a specimen from Moulmein in the British Museum. Whether the form that inhabits Northern Burma is identical with this or the last species is not known.

Habits. Similar to those of C. dukhunensis.

Genus VULPES, Brisson, 1758.

Foxes, although frequently classed in the same genus with wolves and jackals, differ sufficiently to be entitled to generic distinction, being of slighter build with a longer tail, sharper muzzle, proportionally longer body and shorter limbs. The tail is always considerably more than half the length of the head and body, and is covered with long hair. The ears are large, the pupil of the eye vertically elliptical in a strong light, and there are 6 mammæ.

There is no frontal sinus in the skull, and the form of the anterior portion of the brain differs from that of *Canis*^{*}. The upper surface of the postorbital processes is concave. The nasal bones do not extend so far back on the face as the maxillaries.

Dentition: i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{4-4}$, m. $\frac{2-2}{3-3}$, as in Canis.

* Huxley, P.Z.S. 1880, p. 246.

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Fig. 37.-Skull of Vulpes bengalensis. (Gray, P. Z. S. 1868, p. 517.)

Synopsis of Indian Species.

A. Tip of tail black; ears grey outside.

a. Rufous grey, small; skull about 44 inches long V. bengalensis, p. 148.

B. Tip of tail white.

a. Ears black or dull brown outside.

b. Ears pale rufous outside ; size small V. ferrilatus, p. 155.

Foxes are chiefly nocturnal in their habits, hiding in holes or burrows made by themselves, or in ravines or amongst grass or bushes during the day. They are, as a rule, solitary, and rarely if ever associate in numbers as other *Canida* do. All the species are more or less insectivorous and frugivorous; but the more tropical forms appear to live on insects more than those do that inhabit temperate climates. All are highly intelligent and famous for cunning.

72. Vulpes bengalensis. The Indian Fox.

Canis bengalensis, Shaw, Gen. Zool. i, p. 330 (1800); Elliot, Mad. Journ. L. S. x, p. 102.

Canis bengalensis' (and O. rufescens?), Gray, Hardwicke's Ill. Ind. Zool. ii, pls. 2 & 3.

Canis kokree, Sykes, P. Z. S. 1831, p. 101.

Canis valpes indicus, Hodgson, As. Res. xviii, pt. 2, p. 237 (1833).

Cynalopex bengalensis, Blyth, Cat. p. 41.

Vulpes bengalensis, Horsfield, Cat. p. 84; Jerdon, Mam. p. 149.

Vulpes hodgsonii, Gray, Charlesworth's M. N. H. i, p. 578.

Lúmri, Löm, Lokri, H.; Lukhariya in Bundelkand; Khekar, Khikir, Behar; Khek-siyal, Beng.; Kokri, Mahr.; Khekri, Gond; Konka-nakka, Gúnta-nakka, Poti-nara, Tel.; Konk, Kemp-nari, Chandak-nari, Can. Size small. Limbs very slender. Tail shorter in proportion than in typical foxes.

Colour. Above rufescent grey, varying with the season and locality from almost silver-grey to greyish rufous, minutely speckled with white, the sides very much greyer than the back ; lower parts whitish, usually pure white on the chin and throat, pale rufous yellowish or creamy white on the lower breast and abdomen, and more rufescent towards the vent. No cross band on the shoulder. Dorsal fur sometimes white throughout, except at the tip, but when long, in the cold season, white at the extreme base, dusky or purplish slaty, with coarser white hairs intermixed, for about one quarter to one third the length, then creamy white or pale rufous but becoming darker gradually nearly to the end, where there is a white ring followed by a ferruginous or black tip. The fur on the lower parts is whitish throughout. The outer surfaces of the limbs are bright rufous; there is a black spot on each side of the muzzle in front of the eye; the ears are grey outside, whitish within. Tail grey, more or less rufescent above, many of the hairs with black tips, and those at the end of the tail entirely black, forming a sharply defined black tail-tip.

Dimensions. Head and body about 20 inches, tail without the hair at the end 11, with the hair 13 to 14, tarsus and hind foot about 4. A skull is 4.15 inches in basal length, 2.5 broad across the zygomatic arches; a smaller 4 by 2.25. Weight about 7 lbs. (males $7\frac{1}{4}$ to 8, females $5\frac{3}{4}$ to $6\frac{1}{4}$).

Distribution. Found commonly throughout India, except in thick forest, from the base of the Himalayas to Cape Comoria, but not recorded west of Sind and the Punjab, nor east of Assam, where it is rare. Unknown in Burma. Its occurrence in Ceylon is very doubtful; Kelaart mentions a report of its existence in the Badulla district, but evidently without placing any dependence on the story.

Habits. Jerdon's description of this animal's habits is excellent, and is confirmed and supplemented by McMaster's notes. This pretty little fox is familiar to many of the inhabitants of India, being common in most open parts of the country, whether cultivated or waste, and being by no means shy, but frequently coming into gardens and enclosures around houses. I have seen it on the Maidán in Calcutta, and its cry may be heard there almost nightly in the cold season. The sound, a little chattering bark, as Sterndale aptly calls it, consists of a sharp yelp quickly repeated three or four times.

The present species feeds less upon birds and more upon small mammals, reptiles, and insects than its larger allies. It but rarely carries off poultry. According to Sir Walter Elliot, it subsists mainly on rats, land-crabs, grasshoppers, and beetles: but Jerdon has seen it hunting quail, and says that it doubtless kills young birds and eats eggs. He also remarks that lizards are a favourite food with it, that it habitually eats fruit, such as ber (*Zizyphus*), melons, &c., and occasionally pods and shoots of gram or channa

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(Cicer arietinum) and other vegetables; whilst both he and McMaster have observed it feeding on termites or white ants, especially the winged forms that emerge in flights in the hot season. McMaster relates having once near Hyderabad, in the Deccan, seen a fox spring out of the grass and catch moth after moth as they passed him just before dusk.

The burrows in which the Indian fox lives and breeds are usually situated in open plains, sometimes in thorny scrub, a slight rise in the ground, the bund of a tank or other artificial elevation being selected in places liable to be flooded in the rainy season. There are several openings to each burrow, some of them blind, others leading to a larger central chamber, two or three feet below the surface. Jerdon relates that on two occasions he ran foxes to holes in hollow trees.

The Indian fox does not exhale the strong odour characteristic of the European species, and is said to afford but little scent to dogs. *V. bengalensis* is but rarely hunted with foxhounds, partly on this account, partly because of its numerous earths. It, however, is frequently coursed with greyhounds, and gives a good run with Arab, Persian, or half English dogs, pure-bred English hounds being too fast. It doubles in a most dexterous manner, taking advantage of every accident of the ground, such as a ditch or ravine, and frequently making good its escape to earth or into bushes. McMaster, who writes enthusiastically about this game little animal, says he was once beaten by a tired fox, that escaped the dogs by running amongst a herd of sheep and cattle.

In its movements this animal is quick, active and graceful. Jerdon notices that the tail is carried trailing when the fox is going slowly or hunting for food, horizontal when running, and almost erect when making a sudden turn.

This fox is easily tamed and is said to be an amusing pet, free from smell and cleanly it its habits. It is not often kept tame as it is believed to be liable to attacks of rabies. There is, however, some probability that such cases as have occurred, if not caused by infection, may have been due to too close confinement.

The breeding takes place in burrows. The pairing-time varies according to locality from November to January, and the young, almost always four in number, are produced from February to April. At this season the female is seldom to be met with after sunrise, and the cubs are very rarely seen outside their earth till nearly full-grown.

73. Vulpes cana. The hoary Fox.

Vulpes canus, W. Blanford, J. A. S. B. xlvi, pt. 2, p. 321 (1877); Sclater, P. Z. S. 1878, p. 392.

Poh, Baluch.; Kúrba-shákál (cat-jackal), Persian of Kandahár.

Size very small; tail long and bushy; fur long and very soft. Skull (in the only specimen examined) destitute of any sagittal



crest. Muzzle short and narrow. The inner lobe of the upper sectorial tooth very small.

Colour. Ashy grev, blackish on the back and sometimes with a rufescent tinge, white below. The basal half of the dorsal fur is dark purplish grey in some skins, the distal half grey or rufescent; in other cases the bairs are light ashy grey almost throughout, the longer and coarser hairs have white rings near the end, and black tips on the back. The long tail-hairs are ashy near the base, white near the ends, the tips black, the black tips being more developed posteriorly so that the tail has a black tip, though less defined than in V. bengalensis. Ears grey outside, creamy white on the margin and within; forehead rufous; a dusky or black spot on each side of the muzzle. Outside of the limbs dark rufous or dark ashy, almost black in some cases.

Dimensions. Head and body 18 inches, tail with the hair at the end 15 to 16, without $12\frac{1}{2}$ to 13. In the skull the basal length is 3.35, zygomatic breadth 2.

Distribution. Baluchistan and Southern Afghanistan, possibly extending eastwards to Sind. I have hitherto only been able to examine two skins and a skeleton, the types, procured by Major Mockler at Gwadar, and a skin from Kandahar sent to me by Sir O. B. St. John.

Nothing is known of the habits of this species.

74. Vulpes leucopus. The Indian desert Fox.

Vulpes flavescens, Blyth, J. A. S. B. xxii, p. 581, nec Gray. Vulpes leucopus, Blyth, J. A. S. B. xxiii, p. 729 (1854), xxv, p. 443, xxvi, p. 239; Jerdon, Mam. p. 151.

Vulpes griffithii, Blyth, J. A. S. B. xxiii, p. 730; id. Cat. p. 43; Scully, A. M. N. H. ser. 5, viii, p. 226.
Vulpes pusillus, Blyth, J. A. S. B. xxiii, pp. 729, 730; Adams,

P. Z. S. 1858, p. 516; Jerdon, Mam. p. 153.

Lúmri or Lokri, H. and Sindhi; Lombar, Baluchi; Rubah, P.

Size small, though rather larger than that of V. benyalensis. Fur full in winter.

Colour of typical form. In winter the back is more or less rufous, speckled with white, and varies from brownish yellow to rusty red. There is usually a distinct pale patch on each side of the back behind the shoulder, and the cross stripe in front of these patches is well marked. The sides are grey or whitish, more or less speckled, becoming darker, often iron-grey or simply rufous, on the outside of the limbs. The lower parts as a rule are slaty or purplish grey to blackish, abdomen paler, chin and generally a spot in the middle of the breast white. The underfur on the back-purplish brown throughout the basal half to three quarters, the extreme base being sometimes whitish, median portion rufous, then white for some distance, and the tip red. On the sides the hairs are white throughout, except a few which have blackish tips. On the underparts the fur is purplish brown, paler towards the base,

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and with more or less developed white tips. The ears are black or dark brown outside except near the base, whitish within and on the edges. Face rufous, especially round the eye; usually a dark spot in front of each eye. The inside of the fore limbs, and especially the whole anterior surface of the hind limbs to the toes whitish or white, hence the name. Tail above the same colour as the back, less rufous on the sides and below, many of the hairs with dusky tips; terminal portion of tail pure white.

In spring, when the hair is worn, the dark underfur is exposed on the back, and the whole animal is greyer. The lower parts are probably white in summer.

Dimensions. Head and body 19 to 22 inches, tail with hair at the end 12 to 16, without 11 to 14, ear outside 3 to 3.5, tarsus and hind foot 4 to $4\frac{1}{2}$. An average-sized female skull is 4.2 inches long (basal length) and 2.4 broad; a large male skull 4.45 by 2.65. Weight about the same as that of *V. bengalensis*, or rather more; the specimen of which Jerdon gives the weight as $5\frac{1}{2}$ lbs. was probably small.

Varieties. I am inclined to class together the three forms distinguished by Blyth because, after seeing a great many specimens of V. leucopus from Sind and Rájputána, I am unable to find any characters by which the small Afghan fox, V. griffithi, and the Punjab fox, V. pusilla, can be distinguished. Both are probably, as a rule, rather larger, but the difference is trifling; and a skull of V. griffithi from Kandabar, in the British Museum, measures 4:3 inches in basal length, and is of the same size as a rather large skull of V. leucopus from Rájputána. I am indebted to Mr. Theobald for two specimens of a fox, which I believe is typical V. pusilla, from the Potwár in the northern Punjab, and except a trifling difference in size, both agree perfectly with skins of V. leucopus from Sind, whilst they are the same size as large specimens of V. leucopus from Rájputána.

There is some confusion as to V. griffithi, for whilst it is founded on the smaller fox of Afghanistan, the dimensions given by Hutton (J. A. S. B. xiv, p. 344),—head and body 2 feet, tail 17 inches, height at shoulder 14 to 15—agree better with the larger form.

The species described by me in 1875 (A. M. N. H. ser. 4, xvi, p. 310, and 'Eastern Persia,' ii, p. 39) as *V. persica* is possibly identical with *V. leucopus*, though larger.

Distribution. V. leucopus inhabits the dry and semi-desert regious of Western India, Sind, Cutch, Rájputána, the Punjab, and the North-west Provinces as far east as Fatigarh. It is also found in Baluchistan and Afghanistan, and seems widely distributed in South-western Asia, as I have specimens from Muscat in Arabia.

Habits. This is essentially a desert animal, and in India keeps much to sandy wastes, where it appears to live chiefly on the sand-rats, Gerbillus hurriance. Jerdon remarks that the present species keeps to a different kind of ground from that inhabited by *V. bengalensis*, but in Sind both are common on the waste land with scattered bushes that covers so large a portion of the province. V. leucopus, however, appears to be the only form actually found amongst the sand-hills of the desert. The habits, so far as they are known, exhibit no peculiarity. Jerdon considers this fox more speedy than V. bengalensis and capable of giving a capital run even with English greyhounds.

75. Vulpes alopex. The common Fox.

Canis vulpes and C. alopex, Linn. Syst. Nat. i, p. 59 (1766).

Canis vulpes montana, Pearson, J. A. S. B. v, p. 313 (1836).

Canis himalaicus, Ogilby, P. Z. S. 1836, p. 103.

Vulpes nipalensis, Gray, Charlesworth's Mag. N. H. i, p. 578 (1838).
Vulpes montanus, Blyth, J. A. S. B. xi, p. 589, xxiii, p. 730; Adams, P. Z. S. 1858, p. 516; Jerdon, Mam. Ind. p. 152; Blanf. J. A. S. B. xlvi, p. 323, xlviii, p. 95; Scully, P. Z. S. 1881, p. 202; id. A. M. N. H. ser. 5, viii, p. 225.

Vulpes flavescens, Gray, A. M. N. H. (1) xi, p. 118 (1843); Hutton,
 J. A. S. B. xiv, p. 344; Adams, P. Z. S. 1858, p. 516; Blyth, Cat.
 p. 42; Blanford, Yark. Miss., Mam. p. 22, pl. ii.

Vulpes alopex, Blanford, P. Z. S. 1887, p. 635.

Lonri, H.; Rubah, Pers.; Luh 3, Laash Q, Kashmiri; Wannu, Nepal.

A large, and, in winter, richly-coloured fox with long fur and a superb brush. The skull is elongate, but the muzzle is less narrow proportionally than in the smaller Indian forms.

Colour of the Himalayan variety. Middle of the back varving from pure chestnut to dull rufous, speckled with white or yellow, or to dark iron-grey (black and rufous mixed). The cross stripe on the shoulder sometimes scarcely apparent, in other skins very distinct and with well-marked buff patches on each side before and behind. The hinder part of the back and the thighs much grever and more speckled with white; the sides paler in colour; lower parts varying from creamy-white to almost black, being probably much paler in summer than in winter. There is generally a white spot in the middle of the chest, which, with the throat, is often much darker than the belly, or the dusky portion of the latter may be confined to a median band. The woolly underfur on the back purplish brown ; terminal portion of longer hairs rusty-red, with generally a white or whitish ring near the end, the extreme tip often black. The underfur of other parts of the body varies from vellowish white to dusky. The ears are black outside, light rufous or buff within. The face is rufous ; there is a large black spot in front of the eye, and the cheeks are white. The outside of the limbs are ferruginous, black and white mixed, sometimes one colour prevailing, sometimes the other. Tail greyish, more or less rufous, many of the hairs with black tips, but the end of the tail is conspicuously white.

In spring, when the long winter fur is shed, the animal can scarcely be recognized; the dark underfur gives a greyish-brown tinge to the back, whilst the sides are pale and the lower parts whitish. 15

Dimensions of Himalayan specimens. Length of head and body 24 to 25 inches, tail with hair at the end 18 to 20, without $14\frac{1}{2}$ to 17, tarsus and hind foot nearly 6, height 14 to 15 inches; weight (according to Jerdon) 14 lbs. A Himalayan skull measures 4.9 inches in basal length by 2.7 broad.

Varieties. There is a considerable amount of variation, both in size and colour, exhibited by the different races of the common fox, and there is, as yet, much difference of opinion amongst naturalists as to whether these different races should be distinguished by specific names. The fox of Northern and Central Europe is rather larger than the Himalavan fox and much redder; but the variety inhabiting Southern Europe, Canis melanogaster of Bonaparte, approaches more nearly in colour to the Himalayan race. The large Central-Asian fox, V. flavescens, Gray, is a palercoloured and yellower animal as a rule, with very thick fur in winter and a superb brush. It occurs within our limits in Ladák and other parts of Western Tibet, and is found throughout Eastern Tibet and in some of the higher Himalavan valleys south of the main range; also in Eastern Turkestan, Northern Persia, and probably in other parts of Central Asia. It is also, I believe, the form found in Afghanistan. I have not been able to examine any series of skulls from other localities, but those from Eastern Turkestan are larger than Himalayan specimens (one of a female measures 5.45 inches long and 3.15 broad), and equal in size to those of the European fox, whilst the teeth are larger even than in the latter. But it is extremely doubtful if these characters are constant, for there is much variation amongst European foxes. It appears to me that all the large Palæarctic red foxes, together with the North-American cross-fox, C. fullous or pennsylvanicus, must be considered varieties or races of one species.

Distribution. Of these races two are found within the limits of the Indian fauna—V. alopex var. montana of the Western Himalayas, which is described above and is found from Nepal to Kashmir and Gilgit; and V. alopex var. flavescens, the paler, rather larger Central-Asiatic form, occurring in the higher Himalayas, in Tibet, and probably in Afghanistan. No foxes are known to occur in Sikhim or the Eastern Himalayas except close to the snows, and it is doubtful whether any are found in Nepal. Hodgson's specimens were from Simla. Beyoud Indian limits the species is found throughout the greater part of the Palæarctic and (if the views above expressed be correct) Nearctic regions.

Habits. The Himalayan fox lives in brushwood and cultivated land, from an elevation of 5000 or 6000 feet upwards, frequently haunting the neighbourhood of human habitations and feeding upon such birds and small mammals as he can capture. He is very destructive to partridges, pheasants, and other game-birds, and often carries off poultry. In Europe, wherever rabbits are common, foxes live chiefly upon them. The Central-Asiatic variety lives in open country, hiding in burrows or amongst bushes or rocks by day. Like all other foxes, this species, besides killing birds and small mammals, feeds upon insects of various kinds, on the combs and honey of wild bees, on eggs, and on fruits and berries, and is especially fond of grapes. Occasionally it eats carrion. In winter, Captain Hutton says, when the snow is on the ground, these animals are very numerous about Simla, and come close to the houses in search of offal and other food.

Foxes generally live and breed in burrows, but sometimes in holes amongst rocks. The breeding-time is at the end of winter; the period of gestation 9 weeks; the young, usually five to seven in number (in the Himalayas, it is stated by Hutton, only three or four), are produced about the end of March or in April; they are born blind, and remain so for a fortnight. They are full-grown in the autumn, and sometimes breed again the first year. Foxes live thirteen or fourteen years.

In Kashmir Jerdon mentions that in 1865 the 7th Hussars had a pack of hounds and killed many foxes. There are, however, but few localities where the Himalayan fox can be hunted.

76. Vulpes ferrilatus. The small Tibetan Fox.

Vulpes ferrilatus, Hodgson, J. A. S. B. xi, p. 278, pl. Cynalopex ferrilatus, Blyth, Cat. Mam. p. 41.

Igur, Tibetan.

Size considerably less than that of V. alopex. Ears short; brush well developed; fur long, especially on the legs and feet.

Colour. On the back ochraceous, finely speckled with white, the general tint being a pale yellowish rusty; face and outside of ears similar, but rather greyer and less yellow; sides of the neck, breast, and body, and the greater part of the tail nearly pure grey, mixed black and white; tip of the tail white; outside of the limbs yellowish rufous; lower parts white, the middle of the breast conspicuously white and distinct from the dark grey sides. Dorsal fur light grey at the base, then pale rufous, becoming darker near the end, the tips of the longer hairs white, black tips being intermixed, rarely on the back but abundantly on the sides, and especially on the tail except towards the tip. Vibrissæ black.

Dimensions. None are available from fresh specimens. In a skin the head and body measure $24\frac{1}{2}$ inches, tail without the terminal bairs $9\frac{1}{2}$, with the hairs 11, ear outside 2 inches. According to Hodgson, a skull not mature was $4\frac{5}{2}$ inches long and $2\frac{1}{2}$ broad.

Distribution. Tibet, around Lhassa. Stoliczka (J. A. S. B. xxxvii, pt. 2, p. 5) includes this fox among the animals found in the Upper Sutlej valley, but the species does not appear hitherto to have been observed elsewhere within British limits. Its habits are unknown.

SL

ARCTOIDEA.

Family MUSTELIDÆ.

The first family in the third of the great groups into which the typical Carnivora have been divided contains the martens and weasels, the badgers and the otters, an assemblage of animals varying more in external conformation, and also in the characters of the teeth, than is the case in any other family of Carnivora. All agree in the possession of a single upper true molar on each side, and all have two lower molars in each ramus of the mandible except *Mellivora*, which has but one. The number of premolars is variable, and even that of the incisors is not constant. There is no alisphenoid canal. Several genera possess the power of diffusing at will from their anal glands an excessively foetid fluid. Five toes occur on all feet.

The *Mustelida* are somewhat difficult of arrangement when all the genera are taken into consideration; but the Indian forms fall easily and naturally into the three subfamilies amongst which the types belonging to the family have been distributed. These subfamilies are readily distinguished by the characters of the feet and claws.

- A. Toes short, partially webbed; claws short, compressed, acute, curved, often semirectractile. Upper posterior molar of moderate size, elongate transversely. Terrestrial and arboreal......
- B. Foot elongated ; toes straight ; claws non-retractile, slightly curved, non-compressed, blunt, those of the fore feet especially large. Upper posterior molar variable. Habits mostly terrestrial and fossorial
- C. Feet short, rounded; toes webbed; claws small, curved, blunt. Head broad and much depressed. Upper posterior molar large and quadrate. Habits aquatic.....

The above arrangement is identical with Blyth's in his 'Catalogue of the Mammalia in the Museum of the Asiatic Society,' but Jerdon classed the badgers and their allies in a distinct family apart from the weasels and otters.

Throughout the *Mustelide* the form of the skull changes with age, even more than in other Carnivora. The breadth across the zygomatic arches increases, whilst the width of the skull between the orbits diminishes to an extraordinary degree. The sagittal and occipital crests increase long after the animal is fully adult. There is also in many forms a great sexual difference in size. A remarkable example is described by Mr. Thomas (P. Z. S. 1886, p. 125).

Mustelince.

Melinæ.

Lutring.





Subfamily MUSTELINÆ.

The Indian genera of this subfamily are typical forms with a long body and short limbs. The majority of the subfamily are found in the Northern regions of both continents; several occur in the Himalayas, but only one species is known to exist in the Indian Peninsula and in Burma. Two genera are found within Indian limits.

Teeth in molar series on each side 5 above, 6 below.	an shake of
Lower sectorial with inner tubercie. Size about	MUSTELA
Teeth in molar series 4 above, 5 below. No inner tu-	ALCOLLIGA.
bercle to lower sectorial. Size small	PUTORIUS.

By most English naturalists the name *Martes* is used for the martens (*Mustela*), and *Mustela* for weasels and polecats. I have given elsewhere (P. Z. S. 1887, p. 636) my reasons for preferring the nomenclature of French and German writers.

Genus MUSTELA, Linn., 1766.

Syn. Martes, Nilsson.

Body long and slender; limbs short; tail of considerable length. Feet digitigrade or nearly so; toes short; claws compressed, curved, sharp, semiretractile.

Dentition : i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{4-4}$, m. $\frac{1-1}{2-2}$. Upper sectorial with



Fig. 38 .- Skull of Mustela flavigula,

the inner lobe close to the anterior end. Upper true molar nearly the same size as the sectorial. Lower sectorial with small inner tubercle. Vertebra: C. 7, D. 14–15, L. 5–6, S. 3, C. 18–24.

MUSTELIDÆ.

The martens are animals about the size of a domestic cat, more or less arboreal in their habits, and with but little, if any, disagreeable scent.

Synopsis of Indian and Burmese Species.

- A. Tail without hair three fourths the length of
- - head and body..... M. foina, p. 160.

A trace of a fossil *Mustela* has been found in the Siwalik beds. From the fragments found, the species appears to have been similar to *M. flavigula*.

77. Mustela flavigula. The Indian Marten.

Mustela flavigula, Bodd. Elench. An. p. 88 (1785); Cantor, J. A. S. B. xv, p. 194.

Martes flavigula, Blyth, J. A. S. B. xxvi, p. 316; id. P. Z. S. 1864, p. 485; id. Mam. Birds Burma, p. 29; Adams, P. Z. S. 1858, p. 516; Jerdon, Mam. p. 82; Blanf. J. A. S. B. xlvii, pt. 2, p. 156.

Galidictis chrysogaster, Jardine, Nat. Lib. xiii, p. 167, pl. vii (1842). Martes gwatkinsi, Horsfield, Cat. p. 99 (1851).

Kasia, Sirmur; Tuturala, Chitrála, Kumaon and Garhwal; Múl sampra, Nepal; Huniah, Bhot.; Sakku, Lepcha; Anga Prao, Malay.



Fig. 39.-Mustela flavigula. (From Hodgson's drawings.)

Tail long and bushy, measuring, without hair, quite three quarters the length of the head and body. Caudal vertebre 24. Feet more or less naked beneath; in Malay specimens the whole metacarpus and more than half the tarsus being bare, whilst in some Himalayan animals the naked soles appear less developed. Short hairs separate the pads from each other and from the central pad. Fur of body short in Malay skins, moderately long in Himalayan specimens, and with woolly underfur in winter.

The skull resembles that of *M. foina* more than that of *M. martes* in shape, but is larger than either, the zygomatic breadth exceeds half the length, and the sides of the muzzle converge. The length of the upper sectorial along its outer margin exceeds the breadth of the upper true (hindmost) molar. This molar differs in form from that in *M. fuina* and *M. martes* by having the inner lobe no broader from back to front than the outer.

Colour. In the common Indian form the head to below the ears, with the face, nape, and more or less of the hind neck, the rump, tail, and limbs glossy blackish brown to black, the back from the shoulders to the rump pale brown, sometimes brownish white. The chin and upper part of the throat as far as below the ears white; throat and breast yellow or orange or brownish yellow; abdomen similar in colour to the back, but a little paler. The underfur on the back is paler in colour than the terminal portions of the longer hairs.

Varieties. There is, however, a much darker form, found both in the Himalayas and in Southern India, the Galidictis chrysogaster of Jardine and Martes gwatkinsi of Horsfield. The whole animal is dark brown, except the chin, throat, and breast, the two former of which are white, the breast pale yellow. According to Adams, the dark phase is the summer livery, but this requires confirmation. Another variety, found in Southern Tenasserim and the Malay countries, has the head above and the back uniform or nearly so in colour, a moderate hair-brown, not nearly so dark as the head in ordinary specimens, but with a darker band on each side of the nape, forming a margin to the paler throat, which is not always white or yellow, but sometimes, with the breast, light brown. The Malayan race, however, is not, as Jerdon states, paler than others, but the reverse, except on the head. There is, in the British Museum, a blackish-headed specimen from Tavoy, with the back very pale light yellowish brown, this colour extending to the base of the tail. Four different varieties are described by Blyth, one from Southern India being very similar in colour to some Malay specimens, brown throughout, paler on the sides, chin, throat, and breast. In some instances dark brown spots are found on the throat or breast.

Dimensions. Head and body 20 to 22 inches, tail without hair about 16, with hair 17 to 20 (Jerdon's measurement of the tail is erroneous). Weight 4 to $6\frac{3}{4}$ lbs. Basal length of skull 3.53 inches, zygomatic breadth 2.3 inches.

Distribution. Throughout the Himalayas from west of Kashmir (I have a skin from Hazára collected by Mr. A. B. Wynne) to the eastern extremity of Assam, at elevations not exceeding 7000 to S000 feet, also throughout the hilly part of Burma, the Malay Peninsula, and Sumatra. *M. flavigula* is also found in Southern China and even in Amurland (*Radde*). In the Peninsula of India this marten is found on the Nilgiri hills, on the Travancore ranges. and probably on some of the other higher portions of the Western Ghats, but it does not appear to have been recorded in this range north of the Nilgiris. Jerdon says it is found in Ceylon, but I cannot find any notice of its occurrence there.

Habits. The Indian marten lives in hill-forests, and is not unfrequently seen in the daytime, sometimes in pairs, occasionally in families of five or six, hunting among brushwood or on the branches of trees. "When moving about, it is constantly uttering a low chuckle, which is prolonged into a harsh cry when the animal is excited" (Adams). It lives upon birds and their eggs and small mammals, and it is said to kill young deer. It also feeds on reptiles and fruits, and probably on insects, one having been shot by Mr. Bourdillon on a tree in the Travancore hills, apparently in the act of feeding upon cicadas.

This species is said to be easily tamed. Nothing is recorded about its breeding-habits, which probably resemble those of other members of the genus. It has a very slight unpleasant odour.

78. Mustela foina. The beech Marten.

Mustela foina, Erxleben, Syst. Regn. An. p. 458 (1777).

Martes foina, Nilsson, Faun. Scand. i, p. 38 (1820); Alston, P. Z. S. 1879, p. 469; Scully, P. Z. S. 1881, p. 202; id. A. M. N. H. (5) viii, p. 96.

Martes toufæus, Blyth, J. A. S. B. xvî, p. 353, partim; id. Cat. p. 66, nec Hodyson.

Martes abietum, Horsf. Cat. p. 101; Adams, P. Z. S. 1858, p. 517, nec Ray.

Martes leucolachnaea, W. Blanford, Yark. Miss., Mam. p. 26.

Dalla kafak, Afghanistan.

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Tail covered with long hair, and measuring without the hair about half the length of the head and body. Caudal vertebræ about 21. Feet with long hair between the toes, so that the naked pads are much concealed, especially in winter, when the hair is much longer. Body covered in winter with long glossy hair and thick soft woolly underfur. Skull broad, muzzle short with the sides slightly converging. Length of upper sectorial along the outer edge greater than breadth of upper true molar. The inner lobe of the last tooth, the hindmost in the upper jaw, is a very little broader from front to back than the outer lobe, the outer margin of the latter distinctly indented between the two cusps.

Colour. Varying from greyish brown or even whitish brown or brownish grey to deep blackish brown, the tail and limbs usually rather darker than the body; throat and breast white, the extent of the white varying. The underfur varies from ashy to pure white.

In general the fur of this species is inferior to that of the pinemarten, *M. martes*; but some Afghan and Turkestan skins of *M. foina* have beautiful fur, with long, glossy, nearly black piles and very soft white or pale ashy underfur. This is the variety for which I proposed the name Lucolachneea.

Dimensions. Head and body 18 inches, tail without hair 10, with hair 13. Basal length of skull 2.85, zygomatic breadth 1.8.

Distribution. Throughout the greater part of Europe, but not in the extreme north, and in Western Asia. This marten occurs in Afghanistan and probably throughout the greater part of the Himalaya at considerable elevations; specimens have been recorded from Gilgit, Ladák, and Kumaon, and I possess one procured by the late Mr. Mandelli from Upper Sikhim or the neighbouring portion of Tibet. The species has not been found further east.

Habits. Nothing has been recorded of the habits of M. foind in the Himalayas, except that Scully states, in Gilgit, that it keeps to considerable elevations and is but rarely found in the vicinity of villages as low as 5000 feet. In Europe it is more common than the pine-marten, though the latter, as Alston has shown, is the only form occurring in Britain. The beech-marten is bolder than the pine-marten and more often found about human habitations; it lives in trees or amongst rocks, and feeds chiefly upon birds or small mammals, frequently destroying poultry. It is very blood-thirsty, killing more than it requires for food. When pressed by hunger it will eat lizards, snakes, frogs, or fruit, and is said to be very fond of cherries. The pairing-time is about February, the period of gestation 9 weeks, the number of young usually 4 or 5, and they remain blind for 14 days from their birth. Young individuals are easily tamed, and indeed there is good reason for believing that the animal was domesticated by the Greeks and Romans and kept for the same uses as cats are now (see Rolleston, Journ. Anat. Phys. 1868, ii, p. 47).

Martes? toufœus of Hodgson (J. A. S. B. xi, p. 281) was founded upon three furrier's skins that had been brought from Tibet, without skull, tail, or feet. These skins are now in the British Museum and have been labelled M. zibellina, the sable, to which they may perhaps belong. The fur is very soft, the underfur brownish, not at all like that of M. foina. They are very different from the specimens identified with M. toufœus by Blyth.

Mustela martes (Martes abietum of many English writers), the pine-marten, is easily distinguished from M. foind by its narrower skull and differently shaped upper sectorial and true molar (see Alston, P.Z. S. 1879, p. 469). The sable appears to represent the pine-marten in Eastern Asia, and is by some considered only a variety of the latter.

MUSTELIDE.



Genus PUTORIUS, Cuv. 1817.

Syn. Mustela, auct. nec Cuvier.

Body very long, slender, and typically vermiform, limbs very short, tail variable. The external characters are similar to those of *Mustela*, except that the body, in the typical weasels especially, is even more elongate.

Dentition: i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{1-1}{2-3}$. The principal difference from the martens consists in the absence of the anterior premolar in both jaws, in the cusps of the teeth being sharper, and in the absence of the inner tubercle from the lower sectorial. The skull is elongate behind the orbits, but the muzzle is short. Vertebræ C. 7, D. 14-15, L. 5-6, S. 3, C. 15-21.



Fig. 40.-Skull of Putorius canigula.

The forms comprised are the animals known as weasels, polecats, ferrets, and minks, of which many species occur in the northern parts of both hemispheres, and several inhabit the. Himalayas, one at least extending to the hills south of the Assam valley, and another, not hitherto recorded within Indian limits, inhabiting the Malay Peninsula. None are found in the Peninsula of India.

All the species are thoroughly carnivorous and excessively sanguinary and bold, killing, if an opportunity offers, far more than they can consume, and destroying animals much larger than themselves.

Synopsis of Indian Species.

A. Limbs and lower surface darker than	
upper parts. (Polecats.)	D lamatus n 169
h Back variegated with white and dark	1. au valas, p. 105.
brown	P. sarmaticus, p. 164.
B. Lower surface not darker. (Weasels.)	
a. Tail-tip dusky or black.	
a. Lower parts white; whole body	Perminan n 165

b'. Lower parts brown P. subhemachalanus, p. 166.

5. Tail-tip not darker.

a'. A pale median dorsal stripe P. strigidorsus, p. 170. b'. No dorsal stripe.

a". Nose white P. canigula, p. 167. b". Nose the same colour as forehead.

a. Back dark reddish brown P. cathia, p. 169. β. Back light brown P. alpinus, p. 168.

79. Putorius larvatus. The Tibetan Polecat.

Putorius larvatus, Hodgs. J. A. S. B. xviii, p. 447, pls. xi, xii (1849). Putorius tibetanus, Horsfield, Cat. p. 105.

Tail without hair less than half the length of the head and body. Fur long, with much woolly underfur. Long hair between the toes greatly concealing the naked toe-pads. Metatarsus thickly furred. Claws sharp.

The skull figured by Hodgson, the only one of the Tibetan form known, is immature, the sutures being all open, although the dentition is adult. The hamular process of each pterygoid bone, which in P. fatidus, the common European polecat, is much curved outwards, in the skull of P. larvatus is but slightly curved, and is in contact with a process projecting forwards from the anterior portion of the bulla, as in P. sarmaticus. The upper true molar is dumbbellshaped, the inner lobe being broader than the outer.

Colour. Above dirty whitish or fulvous with a black wash, especially between the shoulders and on the hinder part of the back, owing to the long black tips on some of the longer hairs. Underfur whitish throughout. Part of the face between the eyes brown (perhaps black or blackish, as described by Hodgson, in fresh specimens), the tip of the nose and the chin white. The throat, breast, all the limbs, the groin, and the tail except near the base blackish brown, abdomen whitish.

Dimensions. Hodgson gives the following :---head and body 14 to 16 inches, tail with hair at the end 7, without 6, planta with nails 23 (in another 34).

Distribution. A specimen was procured by Captain (now General) Strachey in Ladák, others by Hodgson from the Utsang district of Tibet north of Sikhim.

Habits. Probably precisely the same as those of the common European polecat, which is particularly distinguished amongst the weasel tribe for the evil odour generated by the secretion of its anal glands, whence its name of foumart or foul marten. It lives in woods and thickets, often near human habitations. P. larvatus probably inhabits a less wooded country and hides, like many other species of martens and weasels, amongst stones. The common polecat is very sanguinary and bold, and singularly destructive to game and poultry : it also feeds on frogs and toads. The period of gestation is about 9 weeks, the young, usually 5 to 7 in number, are born about April, in hollow trees or amongst rocks or stones.

The common ferret is a domesticated variety of the polecat.

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Externally *P. larvatus* closely resembles *P. eversmanni* (Lesson, Man. Mam. p. 144) of Western and Northern Asia in form and coloration, but in none of the three skulls of that species in the British Museum is there a process connecting the pterygoid bone with the bulla. The form of the upper true molar, too, appears to me different. *P. putorinus* (Blyth, J. A. S. B. xi, p. 281, note) is evidently the same as *P. eversmanni*.

80. Putorius sarmaticus. The mottled Polecat.

Mustela sarmatica, Pallas, Reise, i, p. 453 (1771); Hutton, J. A. S. B. xiv, p. 346; Blyth, Cat. p. 68; Scully, A. M. N. H. ser. 5, viii, p. 227.

Tail bushy, about half the length of the head and body. Fur shorter and more even than in the common or Tibetan polecats. Very little woolly underfur, the longer hairs coarse and glossy.



Fig. 41.—Putorius sarmaticus.

Skull similar in form to that of the common polecat, not pinched in behind the postorbital processes. The hamular process of the pterygoid on each side is nearly straight, and meets a process running forward from the anterior portion of the bulla, leaving a foramen below, which is nearly or quite filled up in old skulls, so that the mesopterygoid fossa is continued back to between the bulke. Crowns of upper true molars not dumbbell-shaped, but of approximately the same width from front to back throughout.

Colour. Upper parts variegated with brown and yellowish white, underfur on the back greyish brown. Lower parts from the chin, with the limbs, glossy black. Face dark brown to black, except a white band across the forehead. Another band passes across the nape, and includes the upper portion of the ears; the two bands nearly or quite meet below the ears. Hind neck dark brown; there is generally a broad fairly marked whitish band behind each shoulder. The hairs on the tail are very pale brown at the base, then dark

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brown; the terminal portion white, except at the end of the tail where all the tips of the hairs are black.

Dimensions. Head and body 13 inches, tail without hair $6\frac{1}{4}$; weight 8 to 12 ounces. Skull (of a female) 2.05 long (basal length), 1.3 broad across the zygomatic arches.

Distribution. Eastern Europe and parts of Western Asia, generally very rare, but common in South Afghanistan about Kandahar and Quetta. It has been obtained at or near the latter locality by Captain Hutton and Dr. Leith, and, as I learn from Sir O. B. St. John, occurs in Pishin, north of Quetta.

Habits. An excellent account of this animal is given by Hutton, very little about it having been recorded in Europe. It lives in the ground in burrows (probably made by rats originally), and appears to be equally common in cultivation and in uncultivated tracts. It is chiefly nocturnal, but is occasionally seen abroad hunting in the daytime. It feeds on birds, rats, mice, lizards, beetles, and snails, and probably, like the common polecat, on any animals that it can master, and is excessively sanguinary. A caged animal kept by Hutton killed in succession 4 wagtails and 4 rats, two of the latter full-grown and large. The rats were always seized in the same place, just behind the ear, held until they ceased to struggle, and then killed by one or two bites through the back of the skull. As the blood flowed from the wounds, the polecat lapped it up, but never attempted to suck it. Although the animal that slaughtered all these birds and rats had been fasting for some time, it made no attempt to eat its victims during the day, but stored the bodies in a portion of its cage divided off as a sleeping apartment, and only fed after nightfall. The whole account given (l. c.) is too long to copy, but is worth reading.

The young are produced in holes about the end of March or beginning of April and are usually three or four in number.

This species has the same disagreeable fortid odour that is characteristic of the common polecat.

81. Putorius erminea. The Ermine or Stoat.

Mustela erminea, L. Syst. Nat. i, p. 68 (1766); Hodgson, J. A. S. B. vi, p. 564, x, p. 909, xi, p. 280; Horsf. Cat. p. 104; Blyth, Cat. p. 68; Blanf. Yark. Miss., Mam. p. 32.

Body very slender. Tail about a third the length of the head and body. Soles of feet covered with hair except the small toepads. Fur soft, with woolly underfur.

Skull elongate, muzzle very short. The bony palate continues back for more than half the distance between the last molars and the end of the pterygoids, which are simple at the end, not curved outwards, nor is there any process opposite to them projecting from the bulla. Upper molar concave before and behind, so as to be slightly dumbbell-shaped, and slightly emarginate posteriorly on the outer edge.

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Colour. In summer dull chestnut (reddish brown) above, white or yellowish white below, the terminal portion of the tail black. The underfur on the back paler. In winter the whole of the fur is white except the tail towards its extremity, which remains black. In some countries, as in England, the white winter garb is seldom assumed.

Dimensions. Head and body 9 to 11 inches, tail with hair 41 to 6, without hair about 3 to 4. Males are larger than females. A. skull measures 1.7 in basal length, and 1 inch in breadth across the zygomatic arches.

Distribution. Throughout the Palæarctic region as far south as the Alps and the Himalayas. A specimen was obtained in Afghanistan by Griffith, and the species was recorded from Nepal by Hodgson; but the only specimen made over by him to the British Museum is a furrier's skin, said to have been brought from Tibet. Adams says the species is found in the lower and middle regions of the Western Himalayas, but Jerdon very pertinently remarks that no Himalayan examples exist in any of our museums. Indeed the only thoroughly authentic occurrence within our area appears to be that mentioned by Dr. G. Henderson in 'Lahore to Yarkand,' p. 42. He shot a specimen near Dras, north of the Zoji-la, Kashmir. The skin is, I believe, that now preserved in the Indian Museum, Calcutta. Dr. Henderson remarked that the animal was probably rare in the locality, for the people had no name for it.

Habits. The ermine lives in holes in the ground made by rodents, amongst rocks or heaps of stones, or in hollow trees, sometimes hunting in the daytime, but more frequently at night, and killing any mammals, birds, or reptiles that it can master. It kills rats and mice of all kinds, and is well known to be very destructive to rabbits and to feathered game generally. It climbs well, and plunders birds' nests of eggs and young. It is bold and sanguinary. In Europe it pairs in February or March, and has young, usually 5 to 8 in number, in April or May; the latter are blind for 9 days, remain with the mother till the autumn, and are full-grown in the following spring.

The white winter skins from the North, where the fur is thick and close, form the valuable ermine of commerce.

82. Putorius subhemachalanus. The Himalayan Weasel.

Mustela (Putorius) subhemachalana, Hodgson, J. A. S. B. vi, p. 563 (1837); Horsf. Cat. p. 103; Jerdon, Mam. p. 83.

Mustela humeralis, Blyth, J. A. S. B. xi, p. 99.

Mustela horsfieldii, Gray, A. M. N. H. xi, p. 118 (1843). Mustela hodgsoni, Horsf. Cat. p. 103, nec Gray.

? Kran or Gran, Kashmir *; Sang-king, Lepcha; Temon, Bhot.

* See under P. canigula.



Tail moderately bushy, and, without including the hair at the end, nearly half the length of the head and body. Fur moderately long, soft, with some woolly underfur. Soles hairy; long hair between the toe-pads, and between them and the palmar and plantar pads, sometimes almost concealing them. Anal glands as in other species.

Skull more elongate than that of *P. erminea*, and muzzle narrower; otherwise similar. The dentition presents no difference of importance.

Colour. Brownish red, ranging from bright chestnut to bay, some being considerably brighter and more rufous in tint than others; underfur hair-brown. The tip of the tail and the nose are darker, but not black. Chin white, and in many specimens there are white spots or patches on the breast.

Dimensions. Head and body in a large (? male) specimen $15\frac{1}{2}$ inches, tail without hair 6, with hair $7\frac{1}{2}$, tarsus and hind foot $1\frac{3}{2}$. In a small (? female) example the corresponding measurements are 10, 4, 5, and $1\frac{1}{2}$ inches. Weight of a young male 9 ounces. A skull measures 1.85 inches in basal length, and nearly 1 inch in zygomatic breadth.

Distribution. This weasel is found in Nepal and Sikhim at elevations from 7000 to 13,000 feet (I have a specimen procured on Chola by Mr. Elwes at the last-named elevation, and Hodgson caught two in his house at Darjiling). Blyth (J. A. S. B. xxiii, p. 215) records specimens collected by Dr. Stewart near Landour and Mussoorie, and Jerdon states that the species is common in Kashmir, where Leith Adams also records its occurrence; but all the skins I have seen from the Western Himalayas belong to the next species. The specimen procured by Griffith, and erroneously referred by Horsfield to *M. hodgsoni*, is labelled from Afghanistan. Some of Griffith's collections thus labelled were from the Khási hills, so no dependence can be placed upon the locality.

Varieties. The type of Mustela horsfieldi, which was brought from Bhutan, is now in the British Museum. It is smaller and much darker-coloured than Hodgson's type of *M. subhemachalana* in the same collection. But the tint is evidently variable in this species, and as the distribution of colour is precisely similar, I have very little doubt that the difference in size is sexual, and that the two are identical, as was suggested by Jerdon. In Hodgson's MS, drawings three of these darker specimens are represented, and all are noted as young.

Nothing is known of the habits of this weasel.

83. Putorius canigula, The white-nosed Weasel.

Mustela canigula, Hodgson, J. A. S. B. xi, p. 279 (1842). Mustela hodgsoni, Gray, A. M. N. H. xi, p. 118 (1843).

Tail moderately bushy, about half the length of the head and body. Fur of moderate length Soles hairy.



Skull (fig. 40, p. 162) decidedly elongate, the comparatively narrow area behind the postorbital processes very long, but nowhere distinctly contracted, the sides being subparallel.

Colour. Chestnut (brownish red), some specimens darker than others, some being bright chestnut, almost fawn-colour, the tailtip not darker. Underfur hair-brown. The nose as far back as the eyes, both lips, the chin, and a variable area on the throat and upper breast white.

Dimensions. Head and body $15\frac{1}{2}$ inches, tail without hair $7\frac{1}{2}$, with hair $9\frac{1}{2}$. The above are Hodgson's measurements, but are from a skin, and therefore only approximate. A skull from Kashmir is 2.05 inches in basal length, 1.1 broad across the zygomatic arches.

Distribution. Hodgson's types were from Lhassa in Tibet. There are specimens in the British Museum, collected by Major Kinloch, from Chamba and Pangi in the N.W. Himalayas, at an olevation of 8000 feet in each case. I have a skin obtained by Mr. Theobald at Dharmsala, and the species is probably that "with a white blaze on the face" observed by Mr. Lydekker in the Chenáb valley. I cannot help suspecting that this form may inhabit Kashmir, and that it may have been mistaken for its near ally *P. subhemachalanus*. If this be the case, *P. canigula* is probably the Western cis-Himalayan species, *P. subhemachalanus* the Eastern, the former extending further east, however, in Tibet.

Nothing particular is known of the habits of P. canigula.

The type of *Mustela hodgsoni*, Gray, is in the British Museum, and is a rather small and dark-coloured individual of the present species. The name has by Horsfield, Blyth, and Jerdon been applied to other kinds.

84. Putorius alpinus. The pale Weasel.

Mustela alpina, Gebler, Mém. Soc. Imp. Nat. Moscou, vi, p. 213 (1823); Horsf, Cat. p. 104.

Mustela temon, Hodgson, J. A. S. B. xxvi, p. 207; Blanford, Yark. Miss., Mam. p. 32; Scully, P. Z. S. 1881, p. 203; id. A. M. N. H. (5) viii, p. 97.

Temon, Tibetan.

Tail moderately hairy, about half the length of the head and body. Fur short, soft, very thick, with but little woolly underfur. Soles hairy, naked; pads much concealed by the long hair between them. Claws very slightly curved, blunt.

Colour. Above and on the sides light brown (or, as Hodgson calls it, brunnescent fawn) to hair-brown. Underfur rather darker brown at the base, then whitish when the fur is in good condition, the tips brown. Tail the same colour as the body or rather paler. Lower parts, as a rule, yellow or white, with a distinct line of separation from the brown of the sides; but in other specimens there is no distinct separation of colour, and the lower parts are pale brown with a yellow or orange tinge. Forehead rather darker than the back; sides of the head paler brown; both lips, with the chin and the fore feet above, white, and frequently the inside surface of all the limbs and a small portion of the hind feet. Indistinct brown spots are sometimes found on the breast and abdomen.

Dimensions. The only measurements are from skins. Head and body $9\frac{1}{2}$ to $11\frac{1}{2}$ inches, tail without hair 5 to $5\frac{1}{2}$, with hair about $6\frac{1}{2}$, hind foot to calcaneum $1\frac{1}{2}$. A skull from Hodgson's collection measures 1.82 in basal length, and 1 in breadth; another 1.7by 0.97; whilst one from Kumaon is much smaller, only 1.5 by 0.82. The latter may be a female.

Distribution. Within our area this species has been obtained from the country on the northern frontier of Sikhim by Hodgson and Mandelli, from Kumaon by Strachey, and from Gilgit by Scully, and it probably occurs throughout the higher Himalayas and Tibet. The type of *P. alpinus* was from the Altai, and a species, said to be the same, was found in Amurland by Radde.

Habits. The typical P. alpinus is said by Gebler to have young in May, the number not exceeding five. The pairing-season is in February.

The typical skins and skulls of *P. temon* agree well with Gebler's description of *P. alpinus*, and with specimens from the Altai in the British Museum, but the individual from Kumaon, although similar in colour, is remarkably small, agreeing, however, in its dimensions with those given by Radde (Reis. Süd. Ost-Sib. i, p. 50) for the species. It is quite possible that the smaller individuals may be females.

85. Putorius cathia. The yellow-bellied Weasel.

Mustela (Putorius) kathiah, Hodgson, J. A. S. B. iv, p. 702; Horsfield, Cat. p. 102; Jerdon, Mam. p. 84.

Mustela auriventer v. cathia, Hodgs. J. A. S. B. x, p. 909, xi, p. 280. Kathia nyal, Nepal.



Fig. 42.—Putorius cathia, (From Hodgson's drawings.)

Tail about half the length of the head and body, not bushy.

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Fur short and even. Soles partly naked, especially those of the fore feet.

Skull resembling that of P. erminea in form, but narrower. The inner lobe of the upper true molar larger than the outer, and having the tubercle in the middle small but prominent, rising from the centre of a slight depression on the surface of the tooth.

Colour. Back, face, and upper surface of head, including the ears, limbs, and tail, bay (dark brownish red); underfur scarcely paler. Lower parts deep yellow, this colour extending to the inside of the limbs, but more in some specimens than in others; chin and upper lip generally whitish. In two specimens from Mussooree, collected by Captain Hutton and now in the British Museum, the inside of the fore legs is yellow to the feet, and in one the upper surface of the feet is partly whitish.

Dimensions. Head and body 9 to $10\frac{1}{2}$ inches, tail without hair 5 to 6, with hair 6 to 7, tarsus and hind foot about $1\frac{1}{2}$; weight about 6 ounces. A skull measures 1.8 inch in basal length, and 1 in zygomatic breadth. Males are rather larger than females.

Distribution. The Himalayas as far west as Mussooree, at moderate elevations (about 3000 to 8000 feet), and some of the hills south of Assam. There is a specimen from the Khási Hills in the Indian Museum, Calcutta.

Habits. Nothing is known about this animal in the wild state; its food, mode of hunting, breeding, &c., probably resemble those of other weasels and stoats. Hodgson states that it is easily tamed, and is employed by the Nepalese to rid houses of rats, for which purpose it is most efficient. It is also trained to attack larger animals—fowls, geese, and even goats and sheep—which it kills by dividing the artery of the neck.

86. Putorius strigidorsus. The striped Weasel.

Mustela strigidorsa, Hodgs., Gray (errore strigodorsa), P. Z. 8, 1853, p. 191; Horsfield, A. M. N. H. 2nd ser. xvi, p. 107; id. P. Z. 8, 1856, p. 398, pl. xlix; Jerdon, Mam. p. 85.

Tail, without hair, nearly half the length of the head and body. Fur of moderate length; underfur soft and woolly, longer hairs coarse. Soles partly naked. A factid secretion exudes from the anal glands, which are similar to those of *P. cathia*. Mamme 4, subinguinal.

Colour. Deep bay (dark brownish red) throughout, with the exception of the throat and middle of the breast, which are yellow; the chin, a narrow line down the middle of the back, and another along the belly, which are whitish or white. Underfur on the back a little paler than the terminal portions of the hairs.

Dimensions. Head and body 12 inches long, tail with hair $6\frac{1}{2}$, without $5\frac{1}{2}$, tarsus and hind foot 2; weight $7\frac{1}{2}$ oz. The sex of the specimen measured by Hodgson, to whom we are indebted for the



measurements, is not recorded. There is clearly a considerable difference in size between the sexes.

Distribution. This species has hitherto only been recorded from Sikhim, where two specimens were obtained by Hodgson, probably from a moderate elevation. Two more were procured by Mr. Mandelli, and are in my possession.

Nothing is known of the habits, which are doubtless similar to those of other allied forms. The animal is considerably larger than *P. cathia*, the teeth especially being of much greater size.

Two other species of *Patorius* may hereafter have to be included in the Indian fauna, though at the opposite extremities of the area. The first of these is a weasel described by myself from Eastern Turkestan under the name of *Mustela stoliczkana* (J. A. S. B. xlvi, pt. 2, p. 260, and Sc. Results 2nd Yarkand Mission, Mam. p. 30, pls. i a, ii b). This is allied to the common weasel of Europe, but is considerably larger and rather different in colour. The following is a brief description, which may suffice for identification.

P. stoliczkana.—Colour pale sandy brown above, on the outside of the limbs, and on the tail, white below. Fur short, dense, and soft. Head and body of a male 9 inches, tail with hair 3, without hair 2.3, tarsus and hind foot without claws 1.4; weight 5.2 oz. Skull 1.75 inches long, 1 broad.

There is a specimen from Afghanistan in the British Museum.

The other species is *P. nudipes*, F. Cuv. (Hist. Nat. Mamm. pl. 149), found in the Malay Peninsula (Cantor, J. A. S. B. xv, p. 194), Sumatra, and Borneo. Like so many other Malay species, this may inhabit Southern Tenasserim. A short description is consequently added :—

P. nudipes.—Tail bushy. Soles partly naked. Fur loose and long, with but little underfur. Colour rusty red, the head above and below white, tail-tip whitish. Head and body about 13 inches, tail without hair $8\frac{1}{2}$, with hair $10\frac{1}{2}$; skull 2.25 inches long, 1.35 broad. It is said by Cantor to inhabit the densest jungle.

P. astutus and P. moupinensis have been described by Prof. A. Milne-Edwards * from Moupin, Eastern Tibet, and P. davidianus from the Chinese province of Kiangsi. None of these can be satisfactorily identified with Himalayan forms.

P. astutus is dark rufous-brown above, the tail the same colour throughout; breast white, with a yellow tinge. Upper surface of fore feet white. Length of head and body nearly 10 inches, tail $4\frac{1}{5}$, skull 1.8.

"P. moupinensis is rufous-brown, a little paler below, the face and the tip of the tail darker; chin white or yellowish white. Head and body 13 $\frac{1}{2}$ inches long, tail 9, skull 2.2. This approaches P. subhemachalanus, but has a longer tail.

P. davidianus is light rufous-brown above and below, the head above darker; no dark tip to the tail; chin, upper lip, and sides of

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nose white. In a female the head and body measure 111 inches, tail $6\frac{1}{2}$, skull 2. It is just possible that this may be a variety of P. canigula.

In Gray's "Revision of the Genera and Species of Mustelidæ contained in the British Museum" (P. Z. S. 1865, p. 117), and in the same author's 'Catalogue of Carnivorous &c. Mammalia' (1869, p. 95), Himalaya is given as one of the localities for Vison sibirica (Mustela sibirica, Pall.), and the letters B.M. are appended to show that specimens from the Himalaya are in the British Museum. Iam, however, unable to find any such specimens in the collection. In Blyth's 'Catalogue of the Mammalia in the Museum of the Asiatic Society,' too, Himalava and Tibet are given with a mark of doubt amongst the localities for the same species, but this is due to the mistake of supposing M. hodgsoni to be a synonym.

Subfamily MELINÆ.

This subfamily comprises the badgers and their allies. All are furnished with claws adapted for digging, and thus present some resemblance to bears, with which they have been classed by some naturalists. None of the true badgers have been recorded from within Indian limits, although at least one species belonging to the genus has been found in Tibet. Three genera, however, belonging to this subfamily are found in India or Burma, and are distinguished from each other by the following characters :---

A. Upper molar broader than long, not larger than upper sectorial.

a. An external ear; animal paler below than above ... HELICTIS. b. No external ear ; animal pale above, black below ... MELLIVORA.

B. Upper molar longer than broad, and larger than upper sectorial.

a. Bony palate prolonged back to glenoid fossa ARCTONYX.

Genus HELICTIS, Gray, 1831.

Syn. Melogale, Geoffroy (1884).

Size small. Body and head elongate, the nose prolonged and terminating in a naked, obliquely truncated snout, separated from the upper lip by a narrow hairy space. The nose is naked above for about one third the distance to the eyes. Limbs short. Claws much compressed, fore claws about double the length of the hind. Soles naked; on the hind foot the naked portion terminates some distance in front of the heel. Ears short, but distinct. Mamme 4.

Dentition: i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{4-4}$, m. $\frac{1-1}{2-2}$. The upper sectorial, which in both Indian and Burmese forms is much larger than the true molar behind it, has a very large inner lobe divided into two distinct pointed cusps. There is a very small pointed cusp at the anterior extremity of the tooth. The molar is broader than long,

the outer margin slightly indented, the crown with several small cusps. The lower sectorial has a heel about one third the length of the tooth.



Fig. 43.-Palate of Helictis personata.

Skull with the nasal portion narrower than in other genera of the subfamily, and with the palate extending backwards to about halfway between the hindmost molars and the glenoid fossa. Infraorbital foramen large. Vertebræ: C. 7, D. 14, L. 6, S. 4, C?

The species of *Helictis* have longer bodies and shorter limbs than badgers, but are allied to the latter and not to *Gulo* or any other genus of the *Mustelinæ*, so that it is incorrect to call them wolverines, as Jerdon and others have done. Blyth's term Brockweasel is better, but the animal is not a weasel. All the species are very similar externally, but there are differences in the dentition.

An account of the anatomy of a Chinese species has been given by Garrod (P.Z.S. 1879, p. 305).

Synopsis of Indian and Burmese Species.

A. Colour brown or yellowish brown, not grey.... H. orientalis, p. 173.
 B. Colour brownish grey H. personata, p. 174.

87. Helictis orientalis. The brown Ferret-badger.

Gulo orientalis, Horsfield, Java, pl.

Gulo nipalensis, Hodgs. J. A. S. B. v, p. 237, vi, p. 560.

Helictis nipalensis, Gray, P. Z. S. 1853, p. 191; Jerdon, Mam. p. 80.

Oker, Nepalese ; Nyentek, Malay.

Tail, without the hair, exceeding half the length of the head and body. Fur consisting of soft woolly underfur and longer coarse piles. Teeth of moderate size; outer lobe of the upper sectorial projecting beyond the extremity of the inner lobe in front and behind; anterior cusp of the inner lobe much larger than the posterior.

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Colour. Above dark brown, almost chocolate-brown in general, but some individuals appear rather paler. The underfur is pale brown. A narrow median stripe from the crown of the head to the middle of the back or even to above the hips pure white; also the cheeks and an interrupted band across the forehead, sometimes reduced to a frontal spot. The margin of the ears and terminal third to half of the tail whitish. Lower parts brownish white, sometimes yellowish, the breast and throat paler. Sometimes the pale colour is confined to the middle of the abdomen, the sides being brown.

Dimensions. In a female the head and body measure 16 inches, the tail without hair $7\frac{1}{2}$, with hair 9, hind foot from heel $2\frac{1}{4}$. A skull measures 2.75 inches in basal length, and 1.75 across the zygomatic arches.

Distribution. The Himalayas in Nepal and Sikhim at moderate elevations, and Java. Other supposed localities probably refer to the next species.

Habits. Very imperfectly known. The animal is nocturnal and lives generally in forests, but wanders into houses, and Anderson says he killed one at night in the house of a Sikhim Bhotia, to the disgust of the proprietor, who declared the creature to be useful in destroying cockroaches and other insects.

I am unable to find any distinction between the Himalayan and Javanese forms distinguished by many authors as *H. nipalensis* and *H. orientalis*. The cranial differences noticed by Gray, Anderson, and others appear to be due to individual variation only.

88. Helictis personata. The Burmese Ferret-badger.

Melogale personata, Geoff. Bélanger, Voy., Zool. p. 137, pl. v (1834).

Helictis orientalis, Blyth, J. A. S. B. xxxi, p. 332, nec Horsfield.

Helictis nipalensis, Blyth, Cat. p. 70, Mam. Birds Burma, p. 29, nec Hodgson.

Helictis personata, Thomas, P. Z. S. 1886, p. 59.

Kyoung-u-gyi, Burmese (Tickell); Kyoung-pyan, Arakanese.

General proportions precisely similar to those of H. orientalis. Teeth much larger, and the upper sectorial nearly trapezoidal, the inner lobe being remarkably developed and the two cusps much less unequal than in H. orientalis.

Colour. Above brownish grey. In all other respects this form resembles H. orientalis; the dorsal underfur is sullied white, dorsal and frontal bands and cheeks white or yellow, lower parts brownish white or yellow. The longer hairs on the sides have whitish tips. Dark portions of the face much darker than the back generally.

Dimensions. Tickell, in his MS. notes, gives for a female :—head and body 15 inches, tail $8\frac{1}{2}$, hind foot $2\frac{1}{4}$. This I suspect to be small, skulls of this species and stuffed specimens being rather larger than those of *H. orientalis*. The skull of a male measures in basal length 2.85 inches, in breadth 1.87.

Distribution. Recorded from Pegu and Manipur. There is also

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a skin, apparently of this species, from Cachar, in the British Museum, and in all probability the specimens obtained by Blyth from Tipperah and Arakan are the same.



Fig. 44 .-- Helictis personata. (From a drawing by Col. Tickell.)

Habits. This animal is nocturnal like other members of the genus, and appears to be omnivorous. One kept alive by Tickell fed upon fruit, insects, lizards, meat, and eggs, and drank by lapping. It was savage and restless, and appeared well able to defend itself against prowling dogs, as it was kept chained to a tree.

Anderson obtained the Chinese type of the genus, *H. moschata*, distinguished by its very small teeth, in Yunnan, and this species may be found in Upper Burma.

Genus MELLIVORA, Storr, 1780.

Syn. Ursitaxus, Hodgson (1836).

Body stout. Limbs short, strong; fore claws very large. Tail short. No external ear. Coloration peculiar: the upper parts whitish; lower parts and limbs, with the muzzle, uniformly black. Mammæ 4. Anal glands well developed, one opening on each side of the anus. Feet naked below, on the hind feet the naked sole extends to the heel.

Dentition: i. $\frac{6}{6}$, c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{3-3}$, m. $\frac{1-1}{1-1}$. No lower tubercular molar. The upper tubercular (or true) molar much broader than long, thus being transverse and more or less dumbbell-shaped, as in *Mustelinæ*. Upper sectorial large, with the inner tubercle quite at the anterior end. The heel of the lower sectorial very small. Vertebræ: C. 7, D. 14, L. 4, S. 4, C. 15.

The ratels, as they are commonly called in England, have somewhat the form of badgers, but are rather more like bears in gait and appearance. They burrow in the ground, but occasionally



climb trees. One species is found throughout Africa, and one in India, but the distinction of the two is somewhat doubtful.



Fig. 45 .- Skull of Mellivora indica.

Two forms of this genus, Mellivora sivalensis and M. punjabensis, are found in the Siwalik beds of Northern India, together with a representative of an allied but extinct genus, Mellivorodon palaindicus.

89. Mellivora indica. The Indian Ratel.

Ursus indicus, Kerr, An. King. p. 188 (1792).

Mellivora ratel, Gray, Cat. Mam. Birds Nepal &c. B. M. p. 13; Horsf. Cat. p. 120; Blyth, Cat. p. 69.

Mellivora indica, Jerdon, Mam. p. 78.

Ursitaxus inauritus, Hodgson, As. Res. xix, pt. 1, p. 61; id. J. A. S. B. v, p. 671.

Biju, H.; Gorpat, Sindhi; Bájru Bhál, at Bhagalpur; Bharsia, Nipal; Biyu khawar, Tel.; Tava karadi, Tam.; Usa banna, Kol.

Tail without the hair about $\frac{1}{5}$ to $\frac{1}{6}$ the length of the head and body. Fore claws very large, nearly treble the size of the hind claws. No underfur; abdomen very thinly clad.

Colour. Above light grey or whitish grey, lower parts with the limbs black. The dorsal fur consists of longer coarse white hairs mixed with rather shorter and finer hairs which are blackish brown. The whitish upper parts are sharply divided from the black undersurface, and include the crown of the head, though the black area covers the ears, eyes, and muzzle; the upper portion of the tail also is whitish except at the extremity. Fore claws white.



Fig. 46.-Mellivora indica.

Dimensions. According to Hodgson head and body 32 inches, tail 5, with the hair $6\frac{1}{2}$, hind foot to heel $4\frac{1}{2}$. Jerdon gives head and body 26 inches, tail 6. A skull is 4.9 inches in basal length by 3.2 in zygomatic breadth.

Distribution. India generally, from the base of the Himalayas to the extreme south, with the exception of the Malabar coast and Lower Bengal. Not found in Ceylon nor to the east of the Bay of Bengal, but the range extends to the westward certainly as far as Sind.

Habits. Like most of its subfamily the Indian ratel is exclusively nocturnal. During the day it remains in holes, probably dug by itself. According to Jerdon it is most common in hilly districts or in those parts of the alluvial plains of Northern India where the rivers have high banks, affording suitable localities for its dens. It is said to live in pairs, to feed on rats, birds, frogs, and insects, and to be very destructive to poultry. Like the African ratel, it doubtless eats honey and bees when it can get them. Throughout India this animal has the reputation of digging into graves of men in order to feed upon dead bodies, and several of the native names mean "gravedigger," a term often applied to the species by Europeans. In Persia the same belief exists with regard to the badger, and is in all probability equally without the least foundation. Indeed, although the dentition of Mellivora is more carnivorous than that of the true badgers, the fact that the ratel in confinement lives well on vegetable food renders it probable that this animal feeds partly on vegetables, probably finit and roots, in the wild state also. At the same time Jerdon states that he has heard of

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several individuals being trapped whilst committing depredations in fowl-houses, and this is confirmed by McMaster.

Nothing appears to be known of the ratel's breeding-habits. In confinement it is very tame, quiet, and playful, and frequently acquires a habit of tumbling head over heels, for this practice has been noticed in different individuals by Hardwicke, Sterndale, and others.

Genus ARCTONYX, F. Cuvier (1825).

Body and limbs stout, tail short. Snout long, mobile, naked towards the end, and truncated, the terminal disk containing the nostrils being much like that of a pig. Ears very short and rounded. Eyes small. Feet naked below, the naked sole not extending to the heel in the hind foot. Claws of all feet much lengthened, those of the fore feet longest, all slightly curved and blunt. Hair coarse and long, with woolly underfur. Mamma 6.

Infraorbital foramen in the skull very large. Bulla very small. The bony palate extends back to the glenoid fossæ, and is deeply indented behind in the middle. The posterior portion of the palate is formed by processes from the pterygoid bones. This form of palate is peculiar to *Arctony.v* amongst fissipede Carnivora.

Dentition: i. $\frac{6}{37}$ c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{4-9}$, m. $\frac{1-1}{2-2}$. The anterior premolars in both jaws often rudimentary or absent. The upper incisors are arranged in a semicircle. The canines are greatly compressed. Upper sectorial furnished with a large median inner lobe, divided by a transverse groove, but without cusps. Upper tubercular molar much larger than upper sectorial, longer than broad, subtrapezoidal, almost lozenge-shaped, with the heel rounded; this heel becomes worn away in old skulls. Lower sectorial with a large low tuberculated heel. Vertebra: C. 7, D. 16, L. 4, S. 4, C. 20.

The hog-badgers, as Jerdon very appropriately names them, have a singular resemblance to a pig, owing to the form of the snout. But little is known of their habits. Two forms, one of which is very imperfectly known, are recorded from North-eastern India and Burma.

Synopsis of Indian and Burmese Species.

Large; skull from occiput over 6 inches long..... A. collaris, p. 178. Small; skull from occiput less than 5 inches long... A. tavoides, p. 180.

Some details of the anatomy are described by Dr. G. Evans, J. A. S. B. viii, p. 408.

90. Arctonyx collaris. The Hog-badger.

Aretonyx collaris, F. Cuv. Hist. Nat. Mam. pl. 220 (1825); Evans, J. A. S. B. vii, p. 732, pl. xliii; viii, p. 408; Blyth, Cat. p. 71; id. Mam. Birds Burma, p. 20; Jordon, Mam. p. 77.

ARCTONYX.



Mydaus collaris, Gray and Hardwicke, Ill. Ind. Zool. i, pl. vi. Arctonyx isonyx, Hodgson, P. Z. S. 1856, p. 398, pl. 1. Meles (Arctonyx) collaris, Anderson, An. Zool. Res. p. 196.

Bhála-súr (bear-pig, or according to some Bála-súr, sand-pig), H.; Chomhúvho, Thembalcso, Naga; Nuloang, Kuki; No-ok, Manipuri; Quado-Waildu, Mug; Khwe-htu-wet-hti, Arakan; Khwe-ta-wek-wek-tawek, Burmese.

Tail about a third to a fourth the length of the head and body.

Colour. Dirty grey above and below, slightly washed with blackish above, the hairs being sullied white throughout, except the ends of the longer hairs on the back and sides, which are black. Head white, with the exception of a dark brown or black band from the upper lip over the eye and ear, and of another from the chin, which



Fig. 47.- Arctonyx collaris. (From a drawing by Col. Tickell.)

is dusky, backwards across the cheek, joined by a broader and lighter brown band to the eye and ear-stripe. These head-markings appear variable, sometimes the sides of the head are dark except a white space round the eye. Throat, sides of neck, and tail whitish, lower parts and limbs dusky, the latter sometimes black.

Dimensions. Head and body of a male 30 inches, tail 9, with hair 11, bind foot $4\frac{3}{2}$ (a Moulmain animal measured by Tickell). An old skull is 5.5 inches in basal length and 3.5 broad.

Distribution. The base of the Eastern Himalayas in Nepal and Sikhim, Assam, Sylhet, Cachar, Arakan, Pegu, and Tenasserim, Anderson obtained this animal in Western Yunnan, but it is not mentioned in Swinhoe's lists of Chinese mammals, nor has it been observed south of Tenasserim. Sterndale says that he heard of it in the forests of Seoni in the Central Provinces; but as he never saw a specimen, it is doubtful if this was the animal of which he obtained information.

Habits. According to Tickell, in his MS. notes, the hog-hadger frequents undulating stony ground or small hills amongst jungle, and lives in fissures of the rocks or in holes dug by itself. It is thoroughly nocturnal. In captivity it is dull and uninteresting, feeding voraciously on meats, fish, reptiles, or fruit, and it is particularly fond of earthworms. One individual used to pass the

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day sleeping in a hole that it had dug and was very savage if disturbed. When angry it made a loud grunting noise and bit fiercely. It was dull of sight, and its only acute sense appeared to be that of smell. It was in the habit of raising its snout in the air in order to scent anyone who approached, much as a pig does. This animal had no disagreeable smell.

Anderson observed an individual, that was kept in the Zoological Gardens of Calcutta, pound plantains to a pulp with its snout before sucking them into its mouth.

McMaster met with this species near Shwe-Gyeng in Pegu, and observed its bear-like gait, which was also noticed by Duvaucel. It is said to support itself easily in an erect position on its hind feet much as bears do.

91. Arctonyx taxoides. The small Hog-badger.

Arctonyx taxoides, Blyth, J. A. S. B. xxii, p. 591 (1853); id. Cat. p. 71; Anderson, An. Zool. Res. p. 196.

? Meles albogularis, Blyth, J. A. S. B. xxii, p. 590.

? Meles leucolæmus, M.-Edw. An. Sci. Nat. (5) viii, 1867, p. 374;

id. Recherches Mam. p. 195, pls. xxiv, xxvi, xxvii, xxviii.

? Arctonyx obscurus, M.-Edw. Rech. Mam. p. 338, pls. lviii, lxii.

"Adult about half the size of the adult of A. collaris, having a much finer and longer coat, . . . the muzzle less broad and hoglike; . . . the ears also are proportionally smaller; the tail is shorter, and the colour and markings, though similar, are much brighter. Dentition of the upper jaw similar in the two species; in the lower jaw the interspace between the second and third premolars is proportionally much greater in A. collaris than in A. taxoides." (Blyth, l.c.)

Dimensions. The skull of a fully adult female measures :— Extreme length (that is, doubtless, from occiput to anterior border of premaxillaries) $4\frac{3}{4}$ inches, breadth across zygomata $2\frac{3}{8}$, length of bony palate $2\frac{3}{4}$, width at posterior great molar (? between hinder molars) $\frac{1}{4}$. The corresponding measurements in an old female of *A. collaris* are $6\frac{1}{8}$, $3\frac{5}{8}$, $3\frac{7}{8}$, and $1\frac{1}{16}$. (Blyth, l. c.)

Distribution. Assam and Arakan, perhaps also China. The above details are from Blyth's original description, and are confirmed by Anderson. I have been unable to examine specimens of late. Mr. W. L. Sclater has recently sent to me some additional notes on the dentition of the types of *A. taxoides*. He finds that the last upper premolar is trapezoidal in section, and has no tubercles on the inner side; the corresponding tooth of *A. collaris* is subtriangular in section, and bears one or two inner tubercles.

No true badger of the genus *Meles*, with a bony palate much less produced backwards than in *Arctonyx*, has hitherto been observed within the limits of India or its dependencies; but a species has been recorded from Tibet, north of Nepal and Sikhim, and may occur in Western Tibet also or in parts of the Himalayas. This animal was described by Hodgson as *Taxidea leucura* (J. A. S. B.



xvi, p. 763, pl. xxix). The species is, however, a typical Meles, not a Taxidea, and very closely allied to the European M. taxus, of which it may prove only a variety. It is grey above, the hair long and grizzled, being white at the base, black near the end, and white again at the tips. Lower parts and limbs dusky or black, and a blackish line from the upper lip over the eye. Head and body 27 inches, tail 7, and with hair 10. Skull of a female 4.2 inches long from foramen, 2.65 broad across zygomata.

The other recorded species from Tibet, *M. alboqularis*, Blyth, is probably an *Arctonyx*. *Meles taxus* or an allied form may perhaps occur in Southern Afghanistan and Baluchistan.

Subfamily LUTRINÆ.

The otters form the last subdivision of the *Mustelida*, and are a well-marked group in which the general musteline type is profoundly modified and the animal adapted for swimming. The feet are strong, short, and rounded, and the toes webbed. The body is very long. The tail is of considerable length, thick at the base, and in general flattened. The head is broad and depressed. The upper posterior molars are large and subquadrate.

Three fossil species of otter have been detected in the Siwalik beds of the Punjab: two of these, *L. palaindica* and *L. bathygnathus*, were not larger than living species; whilst the third, *L. s valensis*, was the size of a leopard, and had a very different upper sectorial tooth. It was distinguished by Falconer as *Enhydriodon*.

Genus LUTRA, Erxleben (1777).

Syn. Aonyx, Lesson; Barangia &c., Gray.

The feet are in general completely webbed. Soles of the feet naked, the naked sole of the hind foot not extending to the beel. Head long and flat. Ears small. Fur close and short, with woolly underfur.

Skull broad and depressed, with the brain-case large, the facial portion in front of the orbits very short, the frontal region between the orbits and the brain-case long.

Vertebræ: C. 7, D. 14-15, L. 6-5, S. 3, C. 20-26.

Dentition : i. $\frac{3-3}{3-3}$, c. $\frac{1-1}{1-1}$, pm. $\frac{4-4}{3-3}$, m. $\frac{1-1}{2-3}$. Anterior upper premolar very small, situated quite inside the canine. Upper sectorial with a trenchant tricuspid blade and a very large inner lobe, having a raised sharp edge and a deep hollow between the edge and the main blade of the tooth. True molar large, subrectangular broader than long.

All otters are very much alike externally, and the determination of the species is consequently in some cases difficult; but the various

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forms are readily discriminated by their skulls. Dr. Anderson has, I think, succeeded in clearing up much of the confusion in which the Indian species had been left by Gray and others.

Synopsis of Indian, Ceylonese, and Burmese Species.

A. Claws distinct and well developed on all toes.

- a. Head and body more than 2 feet long in adults.
 - a. Upper margin of naked nose angulate in
 - middle; dorsal fur generally grizzled .. L. vulgaris, p. 182. **b.** Upper margin of naked nose straight;

dorsal fur not grizzled L. ellioti, p. 185. b. Head and body 20-22 inches L. aureobrunnea, p. 186.

B. Claws small and rudimentary; size small. ..., L. leptonyx, p. 187.

92. Lutra vulgaris. The common Otter.

Lutra vulgaris, Ervleben, Syst. Reg. An. p. 448 (1777); Blyth, Cat. p. 73; Jerdon, Mam. p. 88, partim; Scully, P. Z. S. 1881, p. 203.

Lutra nair, F. Cuv. Dict. Sc. Nat. xxvii, p. 247 (1823); Elliot, Madr. Journ. L. S. x, p. 100; Blyth, Cut. p. 72, partim; Jerdon, Mam. p. 86, partim; Anderson, An. Zool. Res. pp. 206 &c., pl. xi (skull); Kelaart, Prod. p. 35.

Lutra indica, Gray, Charlesworth's Mag. N. H. i, p. 580 (1837).

? Lutra taraiyensis, Hodgson, J. A. S. B. viii, p. 319 (1839).

Ud, Ud bildo, Páni kutta, H.; Sag-i-áb, P.; Lad, Pán-manjar, Jalmanjar, Jal-mánus, Mahr.; Nirunai, Tam.; Niru-Kuka, Tel.; Nirnai, Can., Mal.; Dalwai bek, Wadári.

The upper edge of the naked muzzle where the bairy part of the nose begins is not straight, but projects in the middle and is concave on each side, running up considerably to the hinder edge of the nostril on each side.

Skull (fig. 48) much depressed and elongate, the length being nearly double the breadth of the brain-case. The frontal region of the skull behind the postoccipital processes narrows gradually for some distance, then expands to form the brain-case. Teeth of moderate size, the rounded inner lobe of the upper sectorial about two thirds the length of the tooth; length of upper sectorial along its outer margin not exceeding the breadth of the six upper incisors taken together.

Colour. Above hair-brown, with a more or less rufous tinge; woolly underfur at the base white, then brown, the tips of the longer hairs usually paler, producing in most Indian specimens a grizzled appearance, which is very characteristic. Lower parts (including the base of the tail below, abdomen, breast, and inside of limbs, throat, chin, and sides of head and neck below the ears) whitish; fur of the chin and throat white throughout, of the other parts white at the base, then light brown, and the tips white. These white tips are much more distinct in old specimens, in which



the colours of the upper and under surfaces are well defined. The young is dusky brown above, paler below, with the two colours less distinct.

Dimensions. Head and body 25 to 29 inches, tail 15 to 16; weight about 16 to 20 lbs., sometimes more. (The measurements given of this animal in India are inextricably mixed up with those of the next species.) A Calcutta skull of an old male measures in basal length 4.25 inches, zygomatic breadth 2.7, height from between bulke 1.35 (in mother 1.5). The corresponding measurements of a female skull are 4, 2.55, and 1.3 inches.

Distribution. The common otter is found throughout the Palæarctic region, extending into the North-west Himalayas; and the Indian form, usually known as *L. nair*, appears to inhabit nearly the whole of India and Ceylon, and to occur east of the Bay of Bengal. Owing to the circumstance that the next species, *L. ellioti*, has only lately been clearly distinguished, the relative distribution of the two cannot be precisely ascertained.

Varieties and Synonymy. Although I can find no constant characters by which to distinguish the Indian otter, L. nair, from the European otter, L. vulgaris, I cannot help suspecting that they may be distinct. As a rule, L. vulgaris appears to be larger, the fur is more rufous and but rarely grizzled. The skull is larger, the brain-case broader, and the upper sectorial and molar proportionally smaller and shorter. Generally the anterior point of the upper sectorial is nearer to the hinder edge of the molar than to the anterior border of the canine. The reverse is the case in L. nair. But on examining a considerable series I find not one of these characters constant, and the skulls, as well as the skins, appear to me in some cases undistinguishable.

The type of L. nair came from Pondicherry; that of L. indica was also from Southern India, and was collected by Sir W. Elliot.

Anderson (l. c. p. 207) has pointed out how difficult it is to identify Hodgson's species, as the types were forwarded to the British Museum without the names being attached, and the skulls were received separately without any indication of the skins to which they respectively belonged. The skins now **marked** L. *tarayensis* in the Collection belong to the next species, but Hodgson's description must, I think, apply to the present.

Habits. Otters inhabit rivers chiefly, but are occasionally found in India in large tanks, and they are common in the great backwaters of the Western Coast, and in the Chilka Lake of Orissa. They also occur in salt-water inlets and tidal streams, and occasionally enter the sea. They are usually seen in India in parties of five, six, or more, consisting probably of a pair of old animals and their full-grown or nearly full-grown offspring. These live together in a den, usually amongst rocks, or, in alluvial countries, in an extensive burrow with several entrances on an elevated spot close to the water. One entrance to the den is generally under the water. The presence of otters, wherever they inhabit, is

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easily recognized by their peculiar web-footed tracks on the sand or mud.

To a considerable extent otters are nocturnal, but in wild countries they are by no means exclusively so. I have repeatedly seen them hunting in rivers up to 9 or 10 o'clock in the morning and again in the afternoon long before sunset. They live chiefly upon fish, crustacea, and frogs, and, as is well known, when they find food plentiful, kill far more than they require to eat. They are said occasionally to attack waterfowl, and to eat the eggs of birds, and in all probability they are, if hungry, not particular; I once came upon a party that were pulling about a small crocodile, but I cannot say whether they had killed it. Their movements in the water are exceedingly rapid and graceful, and they can run with considerable speed on land. In fishing, otters act in concert and surround or drive a shoal of fish. Colonel McMaster, in his ' Notes on Jerdon,' describes an instance in which he saw this done in the Chilka Lake. The otters, at least six in number, swam out in a semicircle, with an interval of about fifty yards between each two. "Every now and then an otter would disappear, and generally when it was seen again it was well within the semicircle with a fish in its jaws, caught more for pleasure than for profit," as the fish were always left untouched after a single bite.



Fig. 48 .- Skull of Lutra vulgaris. (L. nair, Anderson, An. Zool. Res.)

The hearing and sense of smell in otters are well developed; but I am inclined to think them not very sharp of sight. They are very interligent and cunning. Their usual cry is a sharp velp, which they utter when excited or surprised. They are also said to make a whistling sound as a note of alarm.

I cannot find anything recorded about the breeding of otters in India. In Europe they have frequently bred in confinement (P.Z.S. 1881, p. 249). They sometimes, at all events, pair in the





water. There appears to be no particular season for breeding, but the young are generally born in the winter, and the same is probably the case in India. The period of gestation is about sixty-one to sixty-three days, the number of young usually from two to five; these are blind for some time after birth.

Otters are easily tamed when captured young, and become very much attached to their masters, whom they will follow like a dog. They are kept tame by fishermen in several parts of India, especially in Jessore, the Bengal Sunderbans, and on the Indus, and are employed to drive the fish into nets, not, as in China, to actually capture fish for their masters.

93. Lutra ellioti. The smooth Indian Otter.

Lutra monticola, Hodgson, J. A. S. B. viii, p. 320 (1839); Anderson, An. Zool. Res. p. 207, pl. xii, figs. 1-3 (skull).

Lutra taraiyensis, Blyth, J. A. S. B. xi, p. 99, nec Hodgson,

? Lutra simning, Horsfield, Cat. p. 116.

Lutra nair, Cantor, J. A. S. B. xv, p. 195; Blyth, Cat. p. 72, partim; id. Mam. Birds Burma, p. 28, nec Cuv.

Lutra ellioti, Anderson, An. Zool. Res. p. 212.

Iudra, Sindhi; Hpyan, Burm.; Phey, Talain; Bong, Karen; Mamrang, Amrang, Anjing-ayer, Malay.



Fig. 49.-Skull of Lutra ellioti. (L. monticola, Anderson, An. Zool. Res.)

The upper border of the naked muzzle is nearly straight from end to end. Fur smooth and short.

Skull elongate, but much less depressed than that of *L. vulgaris*. Frontal region of skull with the sides parallel for some distance behind the postorbital processes, and then suddenly constricted, so that there is the appearance of a postorbital swelling.

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Molar teeth large; the inner lobe of the upper sectorial very large, more than half the breadth of the tooth, and exceeding two thirds the length. The length of the upper sectorial along the outer edge exceeds the breadth of the six upper incisors taken together.

Colour. Very uniform hair-brown above, with a slight greyish tinge, and without any trace of grizzled appearance. Some specimens are more rutous. Underfur pale brown. Lower parts lighter brown; the breast, throat, chin, and sides of bead and neck whitish or white. In some specimens, probably old, the tips of the hair on the abdomen are white.

Dimensions. Rather less than those of L. vulgaris. A large skull, probably male, measures 4.7 inches in basal length, 3.2 in breadth, and 1.8 in height from between the bulke. A female skull is 4.36 inches long, 2.9 broad, and 1.7 high, similarly measured. I learn from Mr. Scully that this otter is shorter than L. vulgaris, though more robustly built, with a much larger skull. No trustworthy measurements are available.

Distribution. Apparently throughout India, from the Lower Himalayas. Common in the Indus, in Sind, also in Lower Bengal, Burma, and the Malay Peninsula.

Synonymy. This is, I think, probably the L. monticola of Hodgson, and there are several specimens in his collections; but as the species is not a hill-otter the name is misleading, and must be abandoned. L. simung of Horsfield is founded on a skin without a skull from Sumatra, and, though probably referable to this species, the identification is uncertain. I consequently, at Mr. Scully's suggestion, adopt the name L. ellioti.

Habits. Probably very similar to those of L. vulgaris. Whether this is the species kept tame by the Mohánas of Sind and employed by them in fishing, and in capturing porpoises as described by Hume ('Stray Feathers,' i, p. 110), I am doubtful; the tame otter appeared to Hume, as it subsequently did to me, a small kind. There can, however, be little doubt that this is one of the species kept tame and used for fishing by the Malays, as mentioned by Cantor.

94. Lutra aureobrunnea. The Himalayan Otter.

Lutra aurobrunnea, Hodgson, J. A. S. B. viii, p. 320; Anderson, An. Zool. Res. p. 212.

? Barangia nepalensis, Gray, P. Z. S. 1865, p. 124.

"Habit of body still more vermiform (than in *L. indigitata* = *leptonyx*). Tail less than $\frac{2}{3}$ of the body. Toes and nails fully developed. Fur longish and rough. Colour rich chestnut-brown above, golden red below and on the extremities. Length of head and body 20 to 22 inches, tail 12 to 13; weight 9 to 11 lbs."

The above description is quoted from Hodgson. No other naturalist has met with this otter; but there is good evidence in Hodgson's collections at the British Museum that at least one



species, besides L. vulgaris, L. ellioti, and L. leptonyw, is found in Nepal.

There is in the first place the skull to which Dr. Gray gave the name of Barangia nepalensis. Barangia was a genus founded on the hairy-nosed Malay otter (Lutra sumatrana). The Nepal skull is imperfect behind, but would, if perfect, probably be about 4 inches long. The zygomatic breadth is 2:45. The teeth are small. There is much resemblance to the skull of L. sumatrana, but the hinder upper molar is differently shaped, the inner lobe having the same antero-posterior length as the outer. In the Malay species the inner lobe is smaller. This skull is perfectly distinct from those of all known Indian otters.

There is also a flat skin of an otter, rich dark brown throughout, slightly paler and with a golden tinge below. The fur is thick and woolly and somewhat harsh. Both texture and colour may be due to some preservative process. The skin is stretched and distorted, having evidently been hung up by the nose to dry, and it is impossible to say whether the nose was hairy or not. This may be the dyed skin of a young *L. vulgaris*, or it may, as Anderson has suggested, belong to the same animal as the skull already mentioned. The circumstance that only one of each exists in the collection is in favour of the latter view.

Hodgson, as quoted above, gives varying measurements and weights, and from this it might be inferred that he examined more than one individual. I can find no information about the animal in his MS. notes.

It is very probable that L. sumatrana, the hairy-nosed Malay otter (L. barang of Cantor, though not, as Anderson has shown, L. c. p. 204, of F. Cuvier), may extend its range into Tenasserim and even further north. This species and its skull are figured by Anderson (l. c. pls. x, xii). It is a large otter, the length of the head and body in an old male, according to Cantor, being $32\frac{1}{2}$ inches, tail 20, and the colour is deep rich brown throughout, except on the chin and throat, which are whitish. The nose is entirely hairy in young specimens, but in older individuals the hairs become partially worn off. That a third species, besides L. ellioti and L. leptonyx, is found in Pegn is suggested in Col. McMaster's notes.

95. Lutra leptonyx. The clawless Otter.

Lutra leptonyx, Horsfield, Res. Java (with figure); Blyth, Cat. p. 73; Jerdon, Mam. p. 89.

Lutra indigitata, Hodgson, J. A. S. B. viii, p. 320.

Aonyx leptonyx, Cantor, J. A. S. E. xv, p. 195; Horsfield, Cat. p. 117; Blyth, Mam. Birds Burma, p. 28.

Chusam, Bhot.; Suriam, Lepcha; Anjing-ayer, Malav.

Tail about half the length of the head and body. Head short,



rounded. Claws extremely small and rudimentary, and sometimes wanting altogether; the third and fourth toes on all feet considerably longer than the other toes.

Skull much shorter than in other Indian forms, the length being but little more than one and a half times the breadth of the braincase, which is very broad. The inner lobe of the upper sectorial large. The upper (last) molar much larger in proportion to the breadth than in other species.

Colour. Moderately deep brown, with a more or less rufous tinge above, paler below; sometimes the difference is very slight, except on the cheeks and upper lip, with the sides of the neck, chin, and throat, which are whitish or white; this colour is sharply divided from the brown on the sides of the head and neck, but passes gradually into the paler brown of the breast. The underfur of the back is lighter in colour near the base.

Dimensions. Head and body 22 to 24 inches, tail $10\frac{1}{2}$ to 13, hind foot $3\frac{1}{2}$; weight 11 to 13 lbs. A skull measures 3 inches in basal length and 2.25 wide across the zygomatic arches; another 3.1 by 2.4.

Distribution. The elawless otter is found throughout the greater part of the Oriental region. It inhabits the Himalaya generally at low elevations, is found in Lower Bengal, being common near Calcutta, in Assam, Burma, Southern China, the Malay Peninsula, and several of the islands, including Java. Beyond Lower Bengal this species has not been recorded from the peninsula of India, except at considerable elevations on the Nilgiri and some other ranges in the Madras Presidency; but a small otter said by Kelaart to inhabit the neighbourhood of Newera Ellia, in Ceylon, is very possibly L. leptonyx.

Habits. Similar, so far as is known, to those of other otters. This animal is said by Cantor to be kept tame and employed by fishermen in Malacca, together with other species.

By many writers the small clawless otter, Lutra leptonyx, is separated from other Indian otters and classed in a distinct genus, Aonyx, the type of which is the Cape otter, L. inunguis. This is distinguished by having the merest rudiments of claws and the toes half-webbed. L. leptonyx also has very small claws, though not quite so rudimentary as those of L. inunguis, but the toes are as fully webbed as those of most otters. Although it does not differ from Lutra in the same manner as the type of Aonyx does, L. leptonyx has several peculiarities of its own not shown by its supposed ally. Its skull is peculiarly short and broad, with a differently shaped upper posterior molar, and its feet differ from those of other species, including L. inunguis, in the much greater proportional length of the third and fourth toes.

The most remarkable peculiarity of L. leptonyx, the form of the skull, is repeated in a South-American species of otter, L. felina.



Family PROCYONID.E.

In the classification hitherto followed, that of Professor Flower, the Himalayan genus Alburus is made into a separate family ; but the differences from the American Procyonida, comprising the racoons (Procyon), kinkajou (Cercoleptes), and their allies, do not appear sufficient to justify the separation. Hodgson pointed out several characters in which Ælurus agrees with the Procyonidae, and others have been recorded by Flower. Blyth, in his Catalogue, placed the genus between Cercoleptes and Procyon, and the only distinctions especially mentioned by Flower are the presence in Elurus of an alisphenoid canal which is wanting in the American types, and the Asiatic habitat of the former genus. The case of Viverricula already mentioned shows that the presence of an alisphenoid canal is not necessarily a character of importance, whilst to admit geographical distribution as a reason for distinguishing biological groups appears a mistake, and liable to cause incorrect ideas as to natural affinities and the relations of faunas in different regions. I feel even doubtful whether a separate subfamily is required for the Asiatic representative of the Procyonida.

The members of this family are distinguished by having two true molars on each side, both in the upper and lower jaw.

Genus ÆLURUS, F. Cuvier (1825).

This genus contains but a single species peculiar to the Himalayan region.

The head is round, the face short and broad, the eyes directed forward, the pupil round, the ears well developed; the limbs stout, plantigrade, densely covered with hair below; the claws large, curved, sharp, and semiretractile. Tail long. Mammæ 8. Vertebræ: C. 7, D. 14-15, L. 6-5, S. 3, C. 18.

Skull high and compressed. The zygomatic arches very strong and much curved upwards. The coronoid process of the mandible remarkably high, and the distance from the condyle to the angle also unusually great, with the result that the ascending ramus of the lower jaw is singularly developed.

Dentition: i. $\frac{6}{87}$ c. $\frac{1-1}{1-1}$, pm. $\frac{3-3}{4-47}$, m. $\frac{2-2}{2-2}$. The canines are much compressed. The molar teeth are very peculiar (see figure), and differ widely from those of all other Asiatic Carnivora. They are very broad, and the crowns are covered with numerous pointed cusps; these, when worn down, produce a pattern resembling that on the molars of some Ungulates. The upper sectorial is smaller than the first true molar, and semioval in shape, the inner lobe very broad and furnished with three cusps, arranged in a triangle, the inner smaller than the others. The second premolar is very similar to the third or sectorial in shape, and like it has a third

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root supporting the inner lobe. The first lower premolar is small and deciduous. There is much resemblance between the dentition of *Elurus* and that of *Procyon*, though the latter has not the remarkable second upper premolar of the former.



Fig. 50,-Half palate and skull of Ælurus fulgens.

The anatomy is described by Hodgson, J. A. S. B. xvi, pp. 1119, 1124, &c., and xvii, pt. 2, pp. 475, 573, and by Flower, P.Z.S. 1870, p. 752. Several important additions are made in the latter paper, and especially the presence of anal glands, which Hodgson thought were wanting, was demonstrated.

96. Elurus fulgens. The red Cat-bear or Himalayan Racoon.

Ailurus fulgens, F. Cuv. Hist. Nat. Mam. pl. 203 (1825); Horsf. Cat. p. 126; Jerdon, Mam. p. 74; Sclater, P. Z. S. 1809, p. 408; Simpson, P. Z. S. 1869, p. 507, pl. xli,

Ailnrus ochraceus, Hodgson, J. A. S. B. xvi, p. 1118, pls. lii, liii; xvii, pt. 2, pp. 475, 573.

Ælurus fulgens, Flower, P. Z. S. 1870, p. 752; Bartlett, ibid. p. 769.

Wah, Yé, Nigálya-ponya, Nepal; Thokya, Thongwa, Limbu; Wakdonka, Woker, Bhotia; Sankam (or Saknam?), Lepcha.

Tail about two thirds the length of the head and body, or rather more. Fur long and thick, with woolly underfur. Feet and toepads completely concealed by hair.

Colour. Back, head above, and tail rusty red, varying in tint, the middle of the back frequently paler, the forehead always lighter in

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colour, and several pale rings on the tail, the tip of which is black. Limbs inside and lower parts black, often brownish on the abdomen; soles of feet light brown or whitish. Underfur throughout the body hair-brown. Face and lower lips white, with the exception of a vertical stripe of red from just above the eye to the gape; the ears too are white inside and near the edge outside, remainder of outside surface of ears dark red or black; the hair is red also below the ears behind the white cheek-patches. Claws white.



Fig. 51.—*Ælurus julgens.* (P. Z. S. 1869, p. 408.) The dark nose-stripe here represented is generally wanting, and the face is white throughout.

Dimensions. A large male measured : head and body 24 inches, tail 17, or with hair at the end $19\frac{1}{2}$; other specimens measured : head and body 20 to 22 inches, tail 16, or with hair 18, the hind foot from the heel $4\frac{1}{4}$. Weight 7 to $9\frac{1}{2}$ lbs. A large skull is 3.65 inches in basal length, and 3.05 broad across the zygomatic arches.

Distribution. South-eastern Himalayas, from about 7000 to about 12,000 feet elevation. This animal has not been found west of Nepal, but it ranges eastward throughout the mountains north of Assam to Yunnan (Anderson, An. Zool. Res. Introduction, p. xx).

Habits. Hodgson has given a very full account of these, and some useful additions have been made by Dr. Simpson and Mr. Bartlett.

The present animal inhabits forests, and lives in holes of trees, or perhaps amongst rocks. It, however, feeds much on the ground. As a rule it is found in pairs or small families. Its food is almost entirely vegetable, consisting of fruits, acorns, sprouts of bamboo (whence the name Nigálya-ponya), grass, roots, &c. It also eats eggs, and, according to Jerdon, insects and larvæ, though Hodgson says that the individuals kept by him refused similar food (perhaps he did not try the proper kinds). Hodgson also states that it is 192

fond of milk. All observers, however, agree that it either refuses flesh of all kinds, or takes it very reluctantly. Hodgson tried repeatedly the experiment of putting a live fowl in the cage of an *Elurus*, which but rarely killed the fowl, and never ate it.

The sharp and powerful semiretractile claws of Ælurus are thus manifestly not used for predatory purposes, but are admirably adapted for climbing; and there can be no question that this form. like so many of the Himalayan mammalia, is chiefly arboreal in its habits. It is dull of sight and hearing, and even its sense of smell is not very acute; and, according to Hodgson, it is easily captured. having but little speed, cunning, or ferocity to protect it. It grasps articles, such as fruit, readily with its paws, as observed by Bartlett. Its walk is plantigrade; its movements on the ground slow and awkward. It sleeps sometimes coiled up like a cat or dog, with the bushy tail over the head, sometimes resting on its legs with the head tucked under the chest and between the fore legs, a practice common, it is said, with American racoons, and doubtless due to the habit of resting on a branch of a tree. Bartlett especially notices the resemblance between its habits generally and those of the kinkajou (Cercoleptes).

Though by no means distinctly nocturnal, *Æ. fulgens* sleeps much in the day, moving about and feeding in the morning and evening. According to Bartlett it drinks like a bear, by inserting its lips, and not by lapping, though Hodgson says the contrary. Its usual cry, or call-note, is a short faint squeak, said by Dr. Simpson to resemble the chirping of a bird; but when angry it rises on its hind legs like a bear, and attacks with what one observer terms a series of "snorts," and another a "sharp spitting hiss." Jerdon says that a friend of his watched a pair seated high up on a lofty tree, and making most unearthly cries, evidently at the pairing-season.

The period of gestation is not known, but the young are generally two in number, and are produced in spring. They appear to have a long period of helplessness, during which they remain in their place of birth, a hollow tree or hole among rocks, and they remain with the parents until another brood is about to appear.

As a rule these animals appear to be easily tamed even when adult. They are delicate animals, and cannot endure heat, and they also suffer from much cold. When excited, according to Dr. Simpson, a male had the power of emitting a strong odour of musk.

Family URSIDÆ.

The last family of the Arctoidea contains the bears, a very natural group, all of them animals of considerable size, heavily built, thoroughly plantigrade, and with the feet adapted for digging, though not used for fossorial purposes in the same manner as those of badgers, no bears being known to live in holes dug by themselves.

In this family there are two true molars in the upper and three in the lower jaw, all having broad, flat, tuberculated crowns. The upper sectorial differs from that of other Carnivora in wanting the inner root; the tooth has a small posterior inner lobe without a distinct fang, and looks much like a small true molar. The upper molars are all in one line, the last having its longer axis not transverse, but in the same direction as that of the others. The auditory bulla is very little inflated, its lower surface being almost flat.

Much difference of opinion exists as to the generic subdivisions of the family, but most naturalists place the common Indian bear, or sloth-bear, in a distinct genus from true Ursus. The two genera found within Indian limits are thus distinguished :---

Six incisors in the upper jaw URSUS. Four incisors in the upper jaw...... MRLURSUS.

Bears are found throughout the Palæarctic, Oriental, and Nearetic regions, and one species occurs on the Andes in South America ; none are known to inhabit Africa south of the Atlas, or Australia.

The remains of one species of bear, Ursus namadicus, have been found in the Pleistocene Nerbudda beds of Central India; the species was probably allied to U. malayanus. Another form, U. theobaldi, of which a skull has been met with in the Pliocene Siwaliks, may have been an ancestral type of Melursus ursinus. Besides these traces of three species belonging to the extinct ursine genus Hyanarctus occur in the Siwalik beds.

Genus URSUS, Linn. (1766).

Syn. Helarctos, Horsfield (1825).

The feet are broad and completely plantigrade, with the soles naked; the five toes of each foot all well developed and armed with long, compressed, and moderately curved, non-retractile claws. Tail very short. Ears small, erect, rounded, hairy. Pupil round. Mamme 6.

Vertebræ: C. 7, D. 14, L. 6, S. 5, C. 8-10. Skull elongate (except in *U. malayanus*); orbits small and incomplete behind; palate prolonged considerably behind last molars. An alisphenoid canal present. There is a marked projection inside the base of the lower jaw near the angle, as in seals.

Dentition: i. $\frac{6}{67}$ c. $\frac{1-1}{1-17}$ pm. $\frac{4-4}{4-47}$, m. $\frac{2-2}{3-47}$. The three anterior premolars above and below are small, one-rooted, and frequently wanting; the second especially, in bo h jaws, being generally lost in adult skulls. The upper sectorial is considerably smaller than either of the true molars, which are both longer than broad, with flattened, tuberculated grinding-surfaces, much worn down in old animals. The second is much the larger, and has a large backward prolongation or heel. In the lower jaw the first premolar is

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barger and more persistent than the second and third; the lower sectorial has a small and indistinct blade and greatly developed



Fig. 52.—Skull of Ursus malayanus, young. (In older animals the breadth is proportionally much greater.)

tubercular heel. The second true molar is about the same length as the lower sectorial, but broader, the hindmost molar is shorter.

Synopsis of Indian, Ceylonese, and Burmese Species.

A. Colour brown ; claws brown or white U. arctus, p. 194.

- B. Colour black.
 - a. Larger: length over 5 feet; ears 5 to
 - 6 inches long; claws black U. torquatus, p. 197.
 - Smaller: length under 4 feet 6 inches; ears about 2 inches long; claws pale . U. malayanus, p. 199.

97. Ursus arctus. The brown Bear.

Ursus arctos, L. Syst. Nat. ed. 12, i, p. 69 (1766).

Ursus isabellinus, Horsf. Linn. Trans. xv, p. 332 (1827); Adams, P. Z. S. 1858, p. 517; Blyth, Cat. p. 76; Jerdon, Mam. p. 69; Lydekker, J. A. S. B. xlvi, pt. 2, p. 285; Scully, P. Z. S. 1881, p. 203.

? Ursus pruinosus, Blyth, J. A. S. B. xxii, p. 589; W. Blanf. J. A. S. B. xlvi, pt. 2, p. 318.

Barf-ka-rinch, Lál-bhálú, H.; Háput, Kashmiri; Drengmo, Balti; Drin-mor, Ladak; Brabu, Kishtwar; Dúb, Nepal; Tom-khaina, Tibetan; Snow bear of European sportsmen.

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Size large. Claws moderate. Fur long in winter, thick, shaggy, and soft, with woolly underfur, the hair on the back being as much as 8 inches in length; in summer the fur is shorter, thinner and darker. Ears of moderate size, covered with long hair.

Colour. Various shades of brown, from very pale to dark brown, some animals silvery grey from the fur having white tips, some are reddish brown. In the Eastern Tibetan form (U. pruinosus) the hair on the back and limbs is blackish with pale tawny tips. The fur is rather paler and greyer at the base. According to Kinloch, as a rule in Kashmir old males are the darkest, young animals and females paler, but there are exceptions. In young animals there is a white half-collar on the breast, and this mark is conspicuous in older individuals on the new fur, when the long winter coat has recently been shed. Claws generally in Himalayan animals pale or white.

Dimensions rather variable, as in all bears, males being larger than females. The Himalayan race (U. isabellinus) appears, judging from skulls, to run rather smaller than the European brown bear. Scully gives the length in Gilgit as from 4 feet 8 inches to 5 feet 8; according to Kinloch a very large bear would measure about 7 feet from snout to tail, the latter being only two or three inches long; whilst Adams says the largest he measured, out of hundreds, was 7 feet 6 inches long, and 3 feet 5 inches high. A moderate-sized skull is 11.7 inches long in basal length, and 7.25 broad across the zygomata. The largest skull in the Calcutta Museum measures 12.5 inches by 8.8, a large European skull 13 by 9.5.

Distribution. Throughout the greater portion of the Palæarctic region. The brown bear inhabits the Himalaya from Afghanistan as far east as Nepal, at all events, and is, or was, common in Kashmir and many parts of the N.W. Himalaya, but it does not occur in Ladák, Suru, Zanskár, or any of the districts north of the main range, though common further west in Astor and Gilgit. U. pruinosus is found in the neighbourhood of Lhassa.

Synonymy. I can find no sufficient reason for distinguishing U. isabellinus from U. arctus. Both vary in colour, and are often of the same tint, the Himalayan form, like the Syrian, being as a rule paler than the European, perhaps because the two Asiatic varieties inhabit more open ground. The difference in size does not appear sufficiently great or constant to justify distinction.

Habits. In summer the Himalayan brown bear keeps to high elevations, living chiefly on the grass slopes above the forests, close to the snow; in autumn and spring he is found at lower levels, frequently entering the forests, and descending to the neighbourhood of villages to feed on fruit or grain. In winter these bears retreat to caves, and hybernate or remain in a torpid condition until spring. Their winter retreats are usually, at that season, buried beneath the snow. They reappear about March or April, and in those months and May may be found on open spots on the hill-side, where the snow has melted, feeding on the young sprouts



of grass and herbs, digging for roots and turning over stones to search for insects. Grass, herbs, and roots form their principal food, with the addition of various fruits and seeds found in the forest, or plundered from the neighbourhood of villages. They are fond of apricots, peaches, apples, mulberries, walnuts, and buckwheat, to obtain which they descend into the valleys occasionally when the fruits are ripe, soon returning, however, to the higher slopes near the snow. Sometimes they are said to kill sheep or goats, and they have been known to feed on the fiesh of animals they had killed or found dead. Dr. J. L. Stewart (P. A. S. B. 1867, p. 175) records an instance of a large brown bear killing two smaller bears in succession, and eating portions of their bodies. In Europe the brown bear frequently kills and eats animals, it is said even cattle and ponies; but this may be due to vegetable food being less abundant than on the Himalayas, where the brown bear, as a rule, by general testimony is not carnivorous.

Bears are dull of sight and hearing, and although they possess good powers of smell, they appear inferior, even in this respect, to many animals. They can move pretty quickly in a clumsy gallop, but their usual pace is slow. They can climb trees, but in the Himalayas, at all event, rarely do so. The Himalayan brown bear is a very harmless animal, never attacking men, and very rarely, if ever, showing fight even when wounded.

The Himalayan brown bears pair at the end of September, in October and November, and at that time males and females are found together. They, however, go into separate winter-quarters. The young, usually two in number (one with young females), are born in April or May, the period of gestation being about 6 months. Young bears, when born, are very small, scarcely larger than a good-sized rat; they are born hairless and blind, and remain without sight for four weeks ; when they are three or four months old they accompany the mother in her rambles. Cubs of two different years are often found with the mother at the same time ; all remain with her, as a rule, until nearly three years old, at which time they are full-grown. In Russia it is asserted that a male cub of the previous year takes charge of the young belonging to the next litter, and acts as a kind of nurse; but this may be one of the endless folk-lore stories that have accumulated about bears, as about other formidable Carnivora.

One of these stories is to the effect that bears, when attacking, hug those whom they assail, and squeeze them to death. A "bear's hug" is proverbial. The story is apparently without foundation. A bear, from its anatomical structure, strikes round with its paws, as if grasping, and the blow of its powerful arm drives its claws into the body of its victim, causing terrible wounds, but the idea of its "hugging" appears not confirmed by recent observers.

Bears are easily tamed, and it is not uncommon to see examples of this species led about the plains of India. These animals live to a considerable age; a brown bear lived in the well-known Stadt-





grab at Berne, in Switzerland, for 47 years, and a female after 31 years of age bore young.

98. Ursus torquatus. The Himalayan black Bear.

Ursus thibetanus, F. Cuvier, Hist. Nat. Mam. pl. 213 (1824); id. Ossemens Foss. ed. 3, iv, p. 325; Blyth, Cat. p. 76; Jerdon, Mam. p. 70; Lydekker, J. A. S. B. xlvi, pt. 2, p. 285.

Ursus torquatus, Wagner, Schreb. Säugeth. Supp. ii, p. 144 (1841).

Helarctos tibetanus, Horsf. Cat. p. 124; Adams, P. Z. S. 1858, p. 518.

Ursus gedrosianus, W. Blanf. J. A. S. B. xlvi, pt. 2, p. 317; id. P. A. S. B. 1879, p. 4.

Rinch or Rich, Bhálu, H.; Mam, Baluchi; Háput, Kashmiri; Sanár, Hing bong, Nepalese; D. n. Bhotia; Sona, Lepcha; Mágyen, Limbo; Sutum, Daphla; Situm, Abor; Mapol, Garo; Múphúr, Musu-bhurma, Kachári; Vúmpi, Kuki; Sawom, Manipuri; Húghúm, Thógua, Thega, Chúp, Seván, Sápá, Naga; Wek-won, Burmese.

Size moderate. Fur smooth, not long or shaggy ; hair of moderate length, without any woolly underfur ; the hair on the shoulders is, however, considerably elongated in winter, giving the appearance of a hump. Claws comparatively short, strong, and curved. Ears rather large and covered with longish hair.

The skull behind the orbits is longer in proportion than that of *U. arctus*, and the muzzle is shorter. The sagittal crest is but slightly developed even in old animals.

Colour. Perfectly black almost throughout, with the exception of the inverted white crescent or horseshoe-mark on the chest which is narrow, with each end prolonged upwards in front of the shoulder. The chin, too, is white, and sometimes the nose is reddish brown, the upper lip being whitish. Occasionally the paws are said to be reddish brown. Claws black.

Dimensions. There is much variation, and males are larger than females. In several measurements of ordinary individuals given by Hodgson, the head and body vary from 4 ft. 8 in. to 5 ft. 5 in., but a very large male measured 6 feet 5 inches from nose to rump. The tail without hair measures 3 to $3\frac{1}{2}$ inches, the hair at the end 1 to $1\frac{1}{2}$ inches more, the planta or sole of the hind foot to the heel $7\frac{3}{4}$ to 9 inches; ear without hair and measured from crown of head 5 to $5\frac{3}{2}$. Weight of full-grown males 200 to 250 lbs. A good-sized adult skull from Nepal is 10 inches in basal length and 6.8 broad. As a rule this is a considerably larger and heavier animal than the sloth-bear of the Indian Peninsula.

Distribution. This bear is found throughout the forest-regions of the Himalayas, extending westward through parts of Afghanistan into Baluchistan and the Khirthar range on the west frontier of Sind. The western limits are about the frontier of Persia. To the eastward *U. torquatus* is found in the Assam ranges and some of the countries to the southward, being certainly found, though not common, in Pegu, where it was obtained by Theobald, and as