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## VIVERRIDS FROM THE ASIATIC EXPEDITIONS<sup>1</sup>

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The Viverridæ, or civets and their allies, is a family characteristic of tropical and subtropical climates where it largely takes the place of the Mustelidæ or weasels, although a few species extend northward into warm-temperate regions. The collections made by the Asiatic Expeditions, under the direction of Dr. Roy Chapman Andrews, include over two hundred skins, mostly accompanied by skulls, from South China, particularly from Hainan, Fukien, and Yunnan Provinces. Although these seem referable to but six species, the series of each is in most cases so large as to give an adequate idea of the range of individual, sexual, and geographical variation and to allow a fair estimate of the validity of sundry names bestowed in recent years upon certain Chinese specimens. Although no new forms were recognized it has seemed worth while to list the species taken, with critical notes on each.

### *Viverra zibetha* Linnaeus

*Viverra zibetha* LINNÆUS, 1766, 'Syst. Nat.,' 12th Ed., I, p. 65; Bengal (see Thomas, 1911, Proc. Zool. Soc. London, p. 137).

The collection contains a magnificent series of over fifty civet skins, chiefly from Fukien and Szechwan, and includes five from western Yunnan (Lichiang, and Namting River); but in the absence of specimens from India they are all referred provisionally to the typical race, notwithstanding that several subspecific names have been proposed on the basis of one or several skins each. Thus, in 1864, Swinhoe described as *Viverra ashtoni* a specimen from Min River, Fukien Province, which lacked obvious cross-bands on the haunches and had the black dorsal stripe continued to the third dark tail-ring instead of ending (as commonly) with the first. Matschie, in 1908, renamed the Chinese civet *V. filchneri* on the basis of skins secured at Hinganfu, southeastern Shensi, claiming as distinctive characters the presence of wavy cross-bands on the haunches, six instead of five broader black and six narrower white

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tail-rings unconnected with one another dorsally (except that the basal dark ring is united medially with the dorsal stripe), a black tail-tip, a pronounced broadening of the middle dark neck-band, and smoke-gray underfur. More recently, Wroughton (1915, Journ. Bombay Nat. Hist. Soc., XXIV, p. 64) gave subspecific names to two supposed Indian races, *picta* from the Upper Chindwin River, Burma, and *pruinosa* from Little Tenasserim River, Burma. He later (1918, idem, XXVI, p. 46) regarded the former as untenable, but distinguished the latter race by its clear gray without a general yellow tinge to the ground color. Robinson and Kloss have since (1920, Rec. Indian Mus., XIX, pt. 4, p. 176) added another supposed race, *sagillata*, from peninsular Siam, differing in the sharper definition of its markings. Wroughton adds that one of his specimens from Upper Chindwin River is exactly like a skin in the British Museum from Shensi, while Robinson and Kloss maintain that specimens from Tenasserim are invariably more yellow than true *zibetha* instead of grayer as Wroughton claimed.

The present excellent series secured by the Asiatic Expeditions indicates that in all the characters mentioned there is considerable variation. In skins from the same locality, the usual buffy ground-color of the body may be replaced by clear gray—a mixture of white-tipped and blackish hairs; the pattern on the flanks may be extremely indistinct with every gradation to inobvious spots and blotches and even indistinct cross-stripes that become well defined on the rump. The number of rings on the tail is usually twelve, six white and six black, the terminal one black, but it may be five of each, while one from Yenping, Fukien, had no less than eight of each, the last three black ones very close together and separated by very narrow white rings. Usually only the basal black ring is connected dorsally by an extension of the median stripe of the body, but occasionally this may continue to the second or third and even beyond, showing as a few scattered black-tipped hairs. In specimens with a well-developed yellowish tint, it is usual to have the basal one or two black tail-rings provided with a pair of ochraceous centers, separated by the black median stripe. In one exceptionally bright skin from Fukien these centers are rusty in color and are indicated as scattered hairs of that hue on the third black ring. A single female skull from Hainan is slightly smaller in its dimensions than Fukien specimens.

It is obvious that all the characters hitherto used in the attempt to discriminate local races of the civet are subject to wide individual variation, and since there seem to be no striking differences in cranial measurements, I refer all Chinese examples to the typical form.

**Viverricula malaccensis malaccensis** (Gmelin)

*Viverra malaccensis* Gmelin, 1788, Linnæus's 'Syst. Nat.,' 13th Ed., I, pt. 1, p. 92.

A medium-sized civet, grizzled gray and black with a blackish stripe extending along the side of the neck from the posterior base of the ear, and having five to eight narrow dark stripes on the back that become broken into lines of spots laterally; feet and a small crescent about the anterior part of the eye dark brown; tail with six to nine dark rings alternating with white or buffy-tinted rings.

The type locality is Malacca and, although several subspecies have been recognized, Wroughton, in 1918, writes that he has entirely failed in finding one that seems valid. The series now available through the work of the Asiatic Expeditions comprises fifty-eight skins, mostly with skulls, from Yunnan, Szechwan, and Fukien, and twenty from Hainan. The Hainan series is uniformly slightly smaller in size of skull and with one exception represents the gray phase of pelage, while the others are larger of skull, have longer tails, and are practically all of the rufescent type. Since the former series agrees in skull measurements with those published for typical *malaccensis*, I am referring them to that form, the range of which probably includes the entire Malay Peninsula to the Chinese border and Hainan, for Thomas has lately identified as of this race the specimens taken by the Delacour Expeditions. Females average a few millimeters shorter than males in length of cranium and of toothrows.

**Viverricula malaccensis pallida** (Gray)

*Viverra pallida* Gray, 1832, Proc. Zool. Soc. London, p. 63; 1834, 'Ill. Indian Zool.,' II, Pl. vi.

Similar to the preceding but the skull slightly longer in its dimensions (average condylobasal length of ten adult males 100.8 mm. against 95.6 in five adults from Hainan). Color averaging more ferruginous, tail longer, winter pelage longer and with less obvious stripes.

In his review of this genus in 1898, Bonhote regarded the Chinese animal as distinct, and used for it Gray's name *pallida*, based on the colored plate of a specimen sent by Reeves from China, though he published the same name earlier as a *nomen nudum*. While Reeves's animal probably came from the vicinity of Canton, and may therefore not be very different from typical *malaccensis*, yet the series from Fukien, not far to the northward, is so evidently different from the Hainan specimens taken as representing the typical form that it seems safe to apply Gray's name to them. This series of nearly sixty skins shows that the ferruginous phase is the usual one, and that the grayer type of coloring is

very rare. In winter skins the pelage is much longer than that of the more tropical animal and has the stripes and spots much obscured. The number of rings on the tail, which has been used as a distinguishing mark, varies within narrow limits from occasionally as few as six to rarely nine, or even ten.

Mr. C. H. Pope, who secured most of the Fukien series, says that this is chiefly a ground-living animal, frequenting thickets and covered ravines, whence it may easily be driven by dogs.

Its range in China extends north to the Yangtze Valley, where specimens were secured by Mr. Granger at Wanhhsien. Two others from southern Yunnan seem to be the same, and differ in their narrow, less inflated bullæ from the only Indian skull available. It seems likely that *V. m. thai* Kloss of Central Siam will prove not distinguishable from typical *malaccensis* by which its range is surrounded.

#### ***Paradoxurus hermaphroditus laotum* Gyldenstolpe**

*Paradoxurus hermaphroditus laotum* GYLDENSTOLPE, 1917, Kungl. Sv. Vet. Akad. Handl., Stockholm, LVII, No. 2, p. 26.

A series of eight adult skins from Hainan evidently represents the *hermaphroditus* group and, to this species, Dr. J. A. Allen has referred other Hainan specimens. The typical form, however, is restricted on the mainland to the southern portion of the Malay Peninsula, while in southern Siam (Trong) a slightly paler form is interposed, *P. h. ravus* Miller, 1913. Very recently Thomas has listed specimens from Annam as *P. birmanicus* Wroughton (type from near Sagaing, upper Burma), and it is unlikely that the Hainan specimens are very different for they agree fairly well with the description. Gyldenstolpe has shown, however, that his *P. h. laotum* is the same and was published over a month earlier, so that it is here used provisionally for the Hainan animal.

In the series of adults there are five distinct dorsal black stripes on a ground that varies from pale grayish buff to nearly golden. In one the entire throat to the upper chest and the sides and crown of the head are shining black, but in most these parts are much mixed with paler hairs; feet and tail black, the latter at its base more or less mixed with paler hairs, particularly on the lower side.

The only other paradoxure yet known from China is *P. exitus* Schwarz, from near Canton, a small animal, probably a race of *P. minor* Bonhote.

#### ***Paguma larvata larvata* (H. Smith)**

*Gulo larvatus* H. SMITH, 1827, in Griffith's 'Animal Kingdom,' II, p. 281, Pl.

A palm-civet without stripes or tail-rings. Head and nape to shoulders black; a white blaze on forehead sometimes extending a varying distance on to the occiput or neck as a narrow line of white-tipped hairs. A white mark below and another above the eye extending to base of ear and below it, often to a nearly complete half collar. Upper parts and proximal portion of tail grayish to ochraceous; feet and terminal half of tail blackish brown.

With the fine series of over thirty skins secured by the Asiatic Expeditions, I have attempted to review the nomenclatural history of this species. The name *Gulo larvatus* was given, in 1827, by Hamilton Smith, to a specimen in the Leiden Museum, that had been so labeled by Temminck; his colored plate from the same specimen is a fair representation of the animal as we now know it from South China, but the original locality was unrecorded. Temminck who later, in his 'Monographies' (1841, II, p. 329, Pl. Lxv, figs. 1, 2), described it as *Paradoxurus larvatus* and figured the skull, stated that it had been obtained from London. Gray (1831, Proc. Zool. Soc. London, p. 95; 1832, p. 67) had meanwhile redescribed the species on the basis of a specimen from the vicinity of Canton, China, sent by Reeves, referring it first to a new genus, *Paguma*, then to *Paradoxurus*. Of this specimen he published a colored figure (1834, 'Ill. Indian Zool.,' II, Pl. xi), which, though in many respects crude, is nevertheless again a fair representation. For nearly three-quarters of a century the name stood, until Matschie, in 1908, concluded that Hamilton Smith's figure was really that of the Formosan race (named *taivana* by Swinhoe), and hence he renamed the subject of Gray's plate *Paguma reevesi*. Thomas has shown the distinctness of the island race and (1909, Ann. Mag. Nat. Hist., (8) III, p. 377) that it does not really correspond to H. Smith's description as well as do specimens from the lower Yangtze; moreover, it is unlikely that at that early date a living palm-civet would have reached London from Formosa, but while Thomas does not say that Hamilton Smith's animal is identical with Reeves's, I think it may safely be assumed that they both represent the typical form of South China. Thomas then proceeded to describe a new race, *hainana* from the island of Hainan, and by a curious coincidence, Dr. J. A. Allen also described the same form using the same subspecific name. His paper was issued April 17, 1909, while Thomas's was received at Cambridge, Mass., on the previous day from England, so that the latter author must stand as authority for the name. In the following year, Wroughton described as *P. l. intrudens* a large brightly colored race from Yunnan and Burma, the type locality, Myitkyina, North Burma, less than forty

miles from the border of western Yunnan. In 1919, another race, *vagans*, with the hair of the upper parts black-tipped, was named from western Siam by Kloss, and finally, Thomas in 1921, added two more subspecific names, *yunalis* for the animal of western Yunnan, and *rivalis* based on a pale skin from Ichang on the Yangtze. As a basis for these various names, the material previously available has been admittedly inadequate, quite insufficient to indicate the range of variation in any single area. The series collected by the Asiatic Expeditions includes sixteen from Fukien Province, four from Szechwan, about 150 miles from Ichang on the Yangtze, a specimen from Chekiang Province, and eight (all but one without skulls) from western Yunnan. There is also a single young animal from Hainan. A careful consideration of this material makes it pretty certain that only two continental races are represented, namely, one from western Yunnan and the other from eastern Szechwan to the coast. The latter is the typical race, *larvata*; the former should probably stand as *intrudens*, of which *yunalis* would be a synonym.

The range of color variation shown by the Fukien series is considerable. The average skin has the entire back pale ochraceous buff, fading into nearly clear gray on the sides and belly. The underfur is smoky. The base of the tail is colored like the back, the terminal portion becoming black. The white blaze on the muzzle usually extends back between the ears and the whitish mark behind the ear seldom makes more than a narrow crescentic patch on either side. In the same series are individuals in which the ochraceous tinge becomes so reduced as to be practically wanting or in others very faint. At the opposite extreme are one or two in which the ochraceous tips of the body-hairs are so intensified that they are as bright as in the Hainan skin. While the black tip, on the average, includes the terminal half of the tail, in one it is only about a third, while three of the series (two from Fukien, one from Szechwan) lack the black tip altogether and have tails wholly gray or gray tinged with pale ochraceous. A specimen of this type from Kiating, Szechwan is recorded by Jacobi as *Paguma l. reevesi*, but he wisely remarks that it would be unwarranted to found a new race upon it, occurring, as it did, within the range of the typical form. The black tail-tip may be rather well defined, or it may extend as a darkened stripe nearly the whole length of the dorsal side of the tail. The amount of black in the subterminal portion of the longer hairs is further subject to much variation, while the exact extent of the white head-markings is hardly the same in any two skins. The usual condition, however, is to have the white frontal blaze continued back between the ears, but in at least two of the series (from

Fukien) it may be traced as a narrow line of white-tipped hairs nearly to the shoulders. A specimen from Wanhhsien, Szechwan, however, has it well developed to the withers, approaching the condition found in *P. l. intrudens*. While usually more or less of the mustachial vibrissæ are white, in occasional skins they are all black. The chin is black, the throat mixed grayish.

This is an animal of the southern parts of China, hardly extending northward of the Yangtze basin. Mr. C. H. Pope writes that it is said to live in holes and is captured by being smoked out. Of the series secured in the Fukien and Szechwan Provinces, it is noticeable that a large proportion, though nearly full-grown, still have the well-developed milk dentition. This set of teeth evidently is retained for a considerable period, is perfectly functional, and not greatly inferior to the permanent set. Within narrow limits the individual teeth vary a good deal in size among specimens from the same locality and apparently independently of sex, so that too much reliance cannot be placed on the size of the teeth as a racial character. The peculiarly carinate audital bullæ are an interesting feature of the skull.

#### ***Paguma larvata intrudens* Wroughton**

*Paguma larvata intrudens* WROUGHTON, 1910, Journ. Bombay Nat. Hist. Soc., XIX, p. 793.

Similar to *P. larvata* but larger, the back a brighter, deeper tone of ochraceous, the white mark of the forehead extended as a broad stripe to the shoulders, and the facial markings, including the whitish half-collar, more clearly defined.

The type locality is Sima, near Myitkyina, in northeastern Burma, a short distance from the borders of Yunnan, and marks very nearly the western bounds of the species' range. The slightly larger size of the type and of individuals from western China is indicated by the longer skull, 118–120 mm. from back end of occipital crest to gnathion, as against an average of 113 mm. in Fukien specimens. Wroughton considered the few available specimens from western Yunnan the same as his Burmese race, but Thomas in 1921 described as *yunalis* two individuals that were brighter in their ochraceous tint, and with very small suborbital white mark. The type locality is given as Yen-yuen-sien, Yunnan, but it is really in southern Szechwan, about 250 miles east of Wroughton's type locality.

The series of skins secured by the Asiatic Expeditions from Lichiang and the Namting River shows, however, that the white suborbital mark

is normally large and well defined instead of being a "mere vague streak," while the slight amount of variation in the ochraceous shade of the back is probably also chiefly an individual matter. I have therefore ventured to place the name *yunalis* in the synonymy of *intrudens*, which will be the name of the masked palm-civets of southern Szechwan to north-eastern Burma, south through western Yunnan to central Tonkin, whence Thomas has lately recorded specimens under the former name.

While the average skin of *intrudens* shows the white nuchal streak extending as a well-marked line to the shoulders, one from Lichiang has it very narrow and confined to the tips of the neck hairs, ending some 80 mm. from the posterior edge of the black shoulder area, while a second represents the opposite extreme, for the stripe, after continuing quite to the end of the black area, is interrupted for about 35 mm. and then continues indistinctly nearly the whole length of the back. Wroughton mentions a somewhat similar specimen. As in the typical race, an occasional specimen has an all-gray tail, without the black tip.

#### ***Herpestes urva* (Hodgson)**

*Gulo urva* HODGSON, 1836, Journ. Asiatic Soc. Bengal, V, p. 283.

A large mongoose with coarse, grizzled pelage of black and buffy or whitish; feet dusky brown, tail becoming whitish to buffy or ochraceous in its terminal part; a conspicuous white stripe from the corner of the mouth to the shoulder.

The so-called crab-eating mongoose is found in the lower country of South China. The collection contains a skin from Chinkiang, a fine series of 27 secured by Mr. Clifford H. Pope and Rev. H. R. Caldwell in Fukien, as well as four taken by the former collector in Hainan.

Matschie in 1908 gave the name *Urva hanensis* to the Chinese animal on the basis of four skins from Hankow, which, although no specimens from India were available for comparison, appeared to differ from the original description in the following particulars: (1) chin brownish gray, much mixed with white, instead of being white; (2) underfur on the head dark brown with a gray tone instead of light reddish brown; (3) under side ochraceous, feet blackish brown instead of both under side and feet dull brown; (4) tail 250 mm., instead of 275–300 mm. In the matter of color, however, the series at hand shows considerable variation not only in the extent of the white tipping to the hairs, the amount of white or brown on chin, throat and feet, but also in the intensity of the buffy tint, so that in some the underfur is almost whitish, in others rusty, and the



basal portion of the long hairs on the tail varies between similar extremes. The measurement of the tail likewise seems not to be distinctive, so that until more obvious differences can be shown, Matschie's name is best regarded as a synonym. Of the four specimens from Hainan, two are immature, but the two adults are very dark in appearance due to a decrease in the extent of the white hair-tips and a corresponding increase in the black subterminal rings. One or two of the Fukien skins are indistinguishable, however, so that it is hardly feasible to separate the island animal.

***Herpestes rubrifrons* (J. A. Allen)**

*Mungos rubrifrons* J. A. ALLEN, 1909, Bull. Amer. Mus. Nat. Hist., XXVI, p. 240.

A medium-sized species; long hairs tipped black and buffy white giving a finely grizzled appearance; head washed with ferruginous, and the long hairs of the tail faintly tipped with ochraceous; backs of feet russet, belly yellowish drab.

Several additional specimens from Hainan represent this species, the relations of which are apparently with *javanicus* of Java or the mainland *exilis* of Tonkin and Siam. There seem to be no records of other species of mongoose than *H. urva* from the mainland if we except Hilzheimer's *H. albifer* based on skins bought at Hankow. These may even prove to be young of *H. urva*, though Hilzheimer believed they were related to *europunctatus*.

