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MAMMALS

BY

J. LEWIS BONHOTE, M.A., F.Z.S.

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INTRODUCTORY NOTE

ALTHOUGH from so rich a region, it will be seen that our collection of mammals embraces only some sixty-four species, of which several are represented by unique specimens. This is, perhaps, to be explained by the fact that I was only able to devote a small proportion of my time to this group, and also because we were not successful in securing the assistance of natives who were good jungle men. From time to time we set a very large number of traps, but found that the animals, when captured, were frequently either removed by small carnivores or else spoilt as specimens by ants. An efficient trap which will capture small mammals alive has, apparently, yet to be invented. In the districts visited by us I have little doubt, from my own observation, that there are a considerable number of small insectivores, shrews and the like, as well as a great variety of rats and mice, which can only be obtained by the merest accident by a collector who is not prepared to spend the great proportion of his time on the group. The Chiropterous fauna, too, must be very extensive, and I may mention that in the limestone caves near Kuala Lumpur I obtained, in one morning, twelve species, including the rare *Eonycteris spelaea*, which number could doubtless be increased by systematic collecting.

I have added to Mr. BONHOTE's paper certain field-notes made by Mr. ANNANDALE or myself, which are distinguished by being placed between inverted commas.

A complete set of all species obtained, including the types of new species, has been deposited in the National Collection.

HERBERT C. ROBINSON.



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REPORT ON THE MAMMALS

By J. LEWIS BONHOTE, M.A., F.Z.S.

THE mammal collection brought home by Messrs. ROBINSON and ANNANDALE has, perhaps, tended more to our knowledge of the fauna of the Malay Peninsula than any other collection from that district which has reached this country of late years. This has not alone been due to the fact that the present material has been procured on the modern system, accurate measurements being taken, and the skulls carefully preserved apart from the skins, but also because during the last four or five years the 'Skeat' Expedition and the collections of Mr. LYLE in Siam proper, as well as large collections received in America from Dr. W. L. ABBOTT, had, while adding many facts, opened up many interesting points, several of which this collection has enabled us to solve. The result is that, although much still remains to be done, the mammalian fauna of the Malayan area is as well, or even better, known than that of any other part of the Oriental region.

The present collection contains some sixty-four species, of which eight are described as new. The connexion between the Malayan and Bornean fauna is shown, apart from species previously noticed as having representative forms in both localities, by the discovery of a cat, closely related to *Felis badia*, and a small squirrel, related to *S. lowii*, which I have named after Mr. ROBINSON. A species of *Rhinolophus* allied to, but quite distinct from, *R. affinis* is described; this species has been known for some time, but was considered as referable to *R. rouxi*, Temm., which, however, is shown not to be the case. It will probably, eventually, be found to occur in Borneo, as Mr. MILLER has already described another form of it from one of the islands in the S. China Sea, under the name *R. spadix*.

Four species of *Mus* are among the novelties; one, *Mus annandalei*, is a very distinct species, especially in its cranial characters, while of the other three two belong to the *Mus rattus* group, and one is allied to *Mus jerdoni*. Owing to the large number of species already described from this part of the world, the working out of these rats necessitated a very careful examination, as far as was possible, of the whole of the rats of the Oriental region, the results

of which are incorporated in the present paper, and will, I trust, prove of use to future workers. I must here record my thanks to Mr. GERRITT S. MILLER, of the National Museum at Washington, who very kindly sent me over a series of topotypes of several of his recently described species, which have been of the greatest assistance.

Two rare species of bats, whose occurrence on the Peninsula was doubtful, have been procured, viz., *Cynopterus ecaudatus* and *Nycteris javanica*, and also several specimens of Mr. MILLER's recently described *Emballonura peninsularis*.

Several fine adult skulls and skins of the porcupine *Hystrix grotei*, GRAY, hitherto only known from the type, a young specimen, were brought back. They are apparently of the same species as that recorded by me in the 'Skeat' collection as *H. yunnanensis*, which is probably identical with GRAY's species. *Nemorhoedus swettenhami* proves to be a good form distinct from *N. sumatrensis*, and a revision of the *Tragulidae*, partly brought about by the series in this collection, has already been published. In addition to the actual specimens, the collectors have made some very interesting field-notes on the habits and distribution of several species, which will be found under those species to which they refer; among other points, a difference in the habits of *Sciurus vittatus* and *S. nigrovittatus*, which are now proved to be perfectly distinct species, is noted, and a curious difference between the habits of the former species on the East and West Coasts is pointed out. The distribution of species on either side of the Peninsula seems likely to be a matter of considerable interest, but at present our knowledge is too limited for any definite statements to be made; as a rule, the species on either coast appear to be much the same, but their distribution is different; in the case of *Funambulus insignis*, however, the Eastern form differs from that found on the West Coast. It has been found that LINNAEUS' name of *cynomolgus*, for the common macaque could no longer stand, as it applies to an African monkey, probably a baboon, and in consequence, RAFFLES' name of *fascicularis* has been used. Mr. MILLER has been followed in the use of the generic name *Presbytes* instead of that of *Semnopithecus*, in accordance with the laws of priority.

It only remains for me to tender my best thanks to Mr. OLDFIELD THOMAS, who has so greatly helped me with his advice and opinion on the difficult points which arose during the writing of this paper.

Hylobates sp. (?)

'We never actually saw a gibbon except doubtfully, at a great distance, on Bukit Besar, but we frequently heard them near Mabek, and judging from the noise they made they must have been very abundant on the hills round the Semangko Pass on the Perak Pahang boundary.'

'In Upper Perak it is believed by the Malays that different species of gibbon inhabit the two banks of the Perak River, and this belief is, to some extent, born out by the cries heard by myself (see *Anthropology*, part I, p. 1). I was surprised to see a gibbon, a white individual (*H. lar*, LINN.), among the mangrove swamps at the mouth of the Trang River; possibly it had escaped from captivity, as in the Malay Peninsula the genus *Hylobates* is usually confined to hilly ground covered with bamboos or dense jungle. The Siamese of Trang believe that all gibbons are females, being the other sex of the lô tong (*Presbytes*), which, they say, is always male.'—N.A.

Macacus nemestrinus (Linn.)

'The "broh" is frequently met with in captivity in the Patani States, but it is doubtful if it occurs wild in the districts we visited. It is often trained, especially by the Siamese, to pluck the nuts from the cocoanut palms, and captive specimens occasionally attain a very large size, but are apt, when full grown, to become morose and savage.

'This monkey is not uncommon near the villages of Upper Perak, and I believe that I have seen at least one troop in South Perak, at Gedong. It is captured in large numbers at Malacca, and is abundant on the outskirts of the town of Singapore, especially in the grounds of a Mahommedan shrine near the Tanjong Pagar docks.'—N.A.

Macacus sp. (?)

'In a patch of jungle, not far from Biserat, I came across a very large species allied to the preceding. I had only a light collecting gun with me and No. 12 shot, so I was unable to secure it, but as it was very leisurely in its movements I had an excellent view of it. In general colour it resembled *M. nemestrinus*, but excelled in size the largest specimen I have seen of that species, and possessed a very marked ruff of almost white hair round its face. The tail was very short, not more than about three inches in length.'

1. Macacus fascicularis (Raffles)

Simia fascicularis, Raffles, *Trans. Linn. Soc.* XIII, p. 246 (1822).

Macacus cynomolgus (Linn.), Blyth, *Cat.* p. 9; *id.* *Mamm. Birds Burma*, p. 7; Anderson, *An. Zool. Res.* p. 73 (1879); Flower, *P.Z.S.* 1900, p. 316; Bonhote, *loc. cit.* p. 872; and of authors generally.

a. ♂.	Patani.	2nd June, 1901.
b. ♀ ad.	Biserat, Jalor.	16th July, 1901.
c, d. ♀ ad., ♂ jr.	Biserat, Jalor.	16th July, 1901, and 20th July, 1901.
e. ♂.	State of Nawngchik.	17th September, 1901.
f, g. 2 ♂ imm.	Ban Sai Kau (captive spms.).	

This series shows a considerable amount of variation, the male from Nawngchik belonging to the rufous coloured variety (*M. aureus*), which colour is also approached by two specimens from Biserat ; the remainder are of various shades, all belonging to the commoner greenish-brown type.

The skull of one of the females from Biserat shows certain conspicuous differences in the teeth, also in the general build of the skull and size of the bullae. It may possibly be specifically distinct, but much more evidence bearing on the point is required before a definite opinion can be pronounced.

For many years this species has been known under the name of *M. cynomolgus* (LINN.), a name which should, unfortunately, no longer be used for it, as it undoubtedly belongs to an African species, probably a baboon. Nor is the name *M. cynomolgus* (BUFFON nec LINN.), as used by BLANFORD, available, as this species, renamed *M. irus* by CUVIER, was founded on what BUFFON considered to be *M. angolensis major*, REY, but which CUVIER shows to be a different species from Senegal, intermediate between the Guenons and Baboons. There is, therefore, no choice but to fall back on RAFFLES' species, which is well described, leaving little doubt as to the animal intended.

'The "krä," "krah," or "kerah," as it is variously called in different parts of the Peninsula, was common in all districts on the East Coast visited by us. It was specially numerous among the mangroves of the tidal creeks near Jambu, and was also not uncommon at Biserat, where specimens were obtained as they came to feed on the young Indian corn in a newly-made jungle clearing. In South Perak, where monkeys of all species are scarce, possibly owing to the presence of a large aboriginal population, we did not meet with it, but it was abundant in the vicinity of Kuala Lumpur, Selangor.

'Contrary to the experience of many naturalists we found the "kra" very wary, more especially upon the sea coast, where it was found impossible to obtain specimens without the expenditure of a quite disproportionate amount of time. It is frequently to be seen upon the ground walking with a peculiar stride and holding the tail parallel to the general line of the body. When the tide is low it often frequents the mud banks in search of crustaceans, etc., retreating to the mangroves when disturbed and chattering defiance at the intruder at a safe distance. The alarm-note is a rattle-like cry, from which the vernacular name is possibly derived. When young they are very commonly captured for pets by the natives, and one or two may generally be seen beneath the houses in almost every village, but it is very rare to see a really adult male in captivity, as they become very vicious on approaching maturity. Younger specimens seem, as a rule, much more ferruginous in colour than the older ones.

'We had three specimens of this species in captivity for some time, all of which had been taken from their mothers when too young to fend for themselves. Our Malays attempted to teach these monkeys, after they had reached a considerable size, to climb trees and bring down fruit, but we were surprised to find that not one of them was able to make the initial leap by means of which a wild "kra" negotiates the bare trunk of a tree below where the branches originate. Once they were lifted to the first branch they seemed thoroughly at home, but they appeared to have no idea how to commence climbing a tree. It is conceivable that this deficiency may have been partly a physical one, due to disuse of the hind limb in captivity, but we see no reason to regard this as being the case, believing rather that the inability was simply due to lack of education on the part of the monkeys, which had never been taught to climb by their parents. If this is so, it is a point of great interest in animal psychology. It may be well to note in the same connexion that we found that while young kittens of *Felis bengalensis* were able to swim perfectly well before their eyes were open, young Malay otters (*Lutra cinerea*), at the same stage, merely floundered about in a quite ineffectual manner when placed in a basin of water, and sank almost immediately.'

Macacus sp. (?)

'We had in our possession, for some months, a female of a species allied to the preceding, which was said to have been captured on the Patani River. Unfortunately, it died and its body was thrown into the river by one of the servants. It appeared to us to differ from the common form in having a much rounder head and a totally different facial expression, which it is difficult to put into words; in addition, it possessed a small crest, which was formed by the hair radiating from a circular whorl on the top of the head, and it was evident that when full grown it would have been a much smaller animal. We were inclined to regard this specimen as a representative of a species taking the place of *M. fascicularis* in the thickly-wooded central region of the Peninsula, very much as *Presbytes femoralis* probably takes the place of *P. obscurus*. Near Bendang Stah we saw several large families in the trees on the banks of the Patani River, that appeared to belong to the same variety as our captive specimen.'

2. Presbytes obscurus¹ (Reid)

Semnopithecus obscurus, Reid, *P.Z.S.* 1837, p. 14; Flower, *op. cit.* 1900, p. 317; Bonhote, *op. cit.* p. 872.

1. I have followed Mr. Miller (*Proc. U.S. Nat. Mus.*, XXVI, p. 477 (1903)) in using *Presbytes*, Esch., Kotzebue's *Entdeck. Reise*, III, p. 196 (1821), instead of the well-known *Semnopithecus*, Cuv. *Dents. Mamm.*, pp. 14, 247 (1825).

<i>a, b, c.</i>	♂, ♀ skl., juv. in alc.	Tanjong Patani.	10th June, 1901.
<i>d-h.</i>	♂, 4 ♀.	Tanjong Patani.	1st October, 1901, 30th September, 1901.
<i>i.</i>	♂ jr.	Ban Sai Kau, Nawngchik.	18th September, 1901.
<i>k.</i>	♂	Tenebong, Jalor.	11th August, 1901.

A very typical series showing no variation. The immature specimen is just losing the first yellow pelage which is only left on the hind-quarters and tail. Over the rest of the body the hairs are of a uniform greyish-black, the light patch on the occiput being hardly distinguishable.

'The lôtung is very generally distributed over those parts of the Peninsula that we visited, with the exception of South Perak. Near Biserat it was very abundant on the craggy limestone hills in the vicinity, where it was practically inaccessible, but it never approached the village. Among the casuarinas on Tanjong Patani it was abundant and tame, keeping in troops of one old male with five or six females and young; these old males are said by the natives to be frequently very savage and even to attack small children. In habits it is much more arboreal than the "krä," and we never saw one of them on the ground. Judging from two specimens obtained the young must be born about February or March (at the end of the stormy season), and until they are about one-third grown are of a beautiful golden-yellow colour, with fur of a soft and silky texture.

'When driven on to an isolated tree these monkeys would ascend the trunk as high as they could, and then strive to conceal themselves by pressing their bodies as closely as possible against the trunk or some large branch, under which circumstances it was very difficult to make them out exactly. At Tanjong Patani the food of those specimens which we examined had consisted entirely of the young shoots of the casuarina.

'A curious change has taken place in the habits of this species at Biserat within the last two years. When ANNANDALE was there in 1899 as a member of the 'Skeat' Expedition, it was common among the fruit trees of the village, into which one or more families came down from the hills nearly every day. The natives deny that it ever does so now. The reason for the change is probably that the houses of Biserat have recently been separated from one another by a broad roadway. Possibly also the large numbers of Siamese and Chinamen now settled there may have something to do with the disappearance of the lôtung from the village, for these two races, unlike the Malays, eat the flesh of the monkey, believing that it has strong tonic qualities, especially for pregnant women. We noticed that while *P. obscurus* was extremely wary in the interior, it was comparatively tame in the neighbourhood of the purely Malay fishing villages on the coast.'

3. Presbytes femoralis (Martin)

Semnopithecus femoralis, Martin, *Charlesworth's Mag. N.H.* ii, p. 436 (1838);
Flower, P.Z.S. 1900, p. 318.

Semnopithecus siamensis, Müller and Schlegel, *Verbandl.* p. 60 (1841);
Anderson, An. Zool. Res., p. 37 (1879).

a. ♀ imm. Mabek, Jalor. 27th July, 1901.

There can be no doubt that this specimen belongs to the same species as that referred to in the description of *S. femoralis*. As to whether *S. femoralis* and *S. albocinereus* are one and the same species or not is a matter which cannot at present be satisfactorily settled. The typical *femoralis* is quite distinct from the typical *albocinereus*, but apparently intermediate forms may occur.

S. siamensis of MÜLLER should apparently stand as a synonym of *S. femoralis*, and according to the original description, MÜLLER's type was a dark coloured monkey and not 'clear ashy grey' as stated by ANDERSON. The original type locality of *S. femoralis* is Sumatra, so that further series may well prove it to be distinct from *siamensis*.

'I know nothing of this species except that it probably replaces the foregoing in the denser jungle towards the centre of the Peninsula, where it appears to be well known to the natives under the name of 'kaka.' It is extraordinarily agile and shy, and the one troop that we saw kept to the tops of the loftier trees in a patch of thick jungle near Mabek. *Semnopithecus* were very abundant, but I think that all that we saw between Mabek and Biserat belonged to *S. obscurus*.'

Presbytes sp. (?)

On Bukit Besar ANNANDALE saw a large brown monkey with an entirely black face and a very long tail; it was not improbably *S. maurus*.

4. Nycticebus tardigradus (Linn.)

Lemur tardigradus, Linn. *Syst. Nat.* i, p. 44 (1766).

Nycticebus tardigradus (LINN.), *Blanf. Faun. Brit. Ind., Mamm.*, p. 45 (1888);
Flower, P.Z.S. 1900, p. 321; *Bonhote, op. cit.* p. 873.

a. ♂ ad. Jambu, Jhering. 7th June, 1901.

b. ♀ ad. Biserat, Jalor. 18th October, 1901.

Both these individuals belong to the variety described by Mr. BLANFORD as *N. bengalensis* (GEOFFR.)

'In Perak and Selangor this species is known as 'kongkang,' in the East Coast States of Patani and Jalor as 'nilong,' and in Jalor also as 'krä duku.' Around it many native superstitions centre, and the presence of a specimen on a fishing boat is believed to ensure a favourable wind. We never met with the species ourselves, the specimens in the collection having been brought in by the natives.'

5. *Felis pardus*, Linn.

Felis pardus, *Linn. Syst. Nat.* 1, p. 61 (1766); *Flower, P.Z.S.* 1900, p. 323.

a. Skull. Tanjong Luar, Borders of Rhaman and Jalor. November, 1901.

6. *Felis* sp. (?)

There is a single specimen of a young cat from Ban Sai Kau on the 21st May, 1901. The whole of the upper parts are of a dull rusty-red, the under parts white, spotted with black. Although it is impossible to make a definite statement on this single immature individual, it appears to belong to a species most nearly allied to *Felis badia* of Borneo, of which it is possibly the mainland form.

'The specimen commented on above was brought to us by the natives and kept alive for some days. It was of a very savage disposition, and escaping from its cage was killed in process of recapture. The species appears to be well-known to the villagers of the neighbourhood of Bukit Besar, who describe the adult as being of a uniform bright red, and in size "as big as a dog." The smaller jungle cats are known collectively as "rimau akar"—creeper cats.'

***Felis bengalensis*, Kerr**

'We obtained three kittens only a few days old at Kampong Jalor, which may probably be referred to this species.'

7. *Viverra zibetha*, Linn.

Viverra zibetha, *Linn. Syst. Nat.* 1, p. 65 (1766); *Flower, P.Z.S.* 1900, p. 327; *Bonhote, op. cit.* p. 873.

a. ♀ imm. Kampong Jalor. 28th October, 1901.

Precisely similar to the specimen brought home by the 'Skeat' Expedition, and described in my paper quoted above.

There are also three specimens of a very young *Viverra*, procured at Mabek, on the 28th July, 1901, which I would also refer to this species.

They are of a uniform dark-brown colour, and the tail is indistinctly ringed with white, which is most easily seen on the under surface. The large white mark across the throat is plain and conspicuous, but the other two light transverse bands are only faintly visible. The anterior one is dull but uniform in colour, while the posterior one is pure white but somewhat irregular and broken up. The under parts are slightly lighter in tone at the bases of the limbs. Above, the hair on the anterior surface of the ear is conspicuously lighter, but, apart from this, no other markings are easily seen. By close inspection, however, the light markings on the side of the neck may be made out and also traces of light markings on the flanks.

8. *Viverricula malaccensis* (Gmel.)

Viverra malaccensis (Gmel.), *Linn. Syst. Nat.* 1, p. 92 (1788).

Viverricula malaccensis (Gmel.), *Flower, P.Z.S.* 1900, p. 328.

♂ ad. skull. Patani. 15th June, 1901.

‘The above specimen, which was brought to us in too decomposed a state to preserve the skin, was greyish-brown in coloration, with black lateral stripes and ill-defined side stripes on the belly. Tail with greyish-brown and white bands and a broad white tip, the white bands broader than the others.

The vernacular name is *musang bulan* (moon civet), and immature specimens are very frequently seen in captivity, becoming very tame and following their owners about the village.’

9. *Paradoxurus minor* sp. nov.

General appearance of *P. niger*, but only half the size. Colour above, pale fulvous, showing on the back five longitudinal black stripes, of which the two outer ones tend to break up into spots. These stripes converge anteriorly to form one broad black stripe, which arises from the crown of the head, slightly anterior to the ears. Across the forehead the hairs have white tips, giving it a grizzled appearance, while the muzzle, limbs, and under part of the throat are very dark brown. There is a small white crescent below, and slightly anterior to the eye, and a few irregular white spots on the chin. The remainder of the under parts are of a dull brownish-grey, while the flanks show a few irregular black spots. The tail is black throughout its length, with the exception of the terminal three or four inches which are of a dirty white. The hairs throughout the tail have light coloured bases which are most conspicuous at its roots, while the light hairs on the body have dark ash-coloured bases.

The skull, which, except for its size is that of a typical paradoxure, most nearly resembles one marked *P. typus* in the National Collection. The edge of the bony palate is hardly posterior to the posterior angle of the last molar. The audital bullae are placed wide apart and are more rounded on the inferior surface. In other respects, however, the skull hardly differs from that of most species of the genus.

Dimensions (measured in the flesh). Head and body, 450 mm.; Tail, 460 mm.; Hind foot, 64 mm.; Ear, 39 mm.

Skull. Greatest length, 96 mm.; Length of palate, from 43 mm.; Zygomatic breadth, 53 mm.; Breadth of palate, between canines, 10 mm.; Between inner roots of carnassials, 14 mm.; Greatest width of brain-case, 32 mm.

Habitat. State of Jalor (Kampong Jalor), Malay Peninsula.

Type. ♀ adult, collected on the 3rd November, 1901, by Messrs. H. C. ROBINSON and N. ANNANDALE.

The small size of this paradoxure will be quite sufficient to enable it to be at once distinguished from any of the other species known to inhabit the Peninsula. There is a second skull that agrees with that of the type in all respects.

10. *Paradoxurus hermaphroditus*, Schreb.

Paradoxurus hermaphroditus, Schreb. *Sauge*, p. 346 (1778); *Flower*, *P.Z.S.* 1900, p. 329; *Bonhote*, *op. cit.* p. 873.

a. ♀ ad. Kampong Jalor. 13th November, 1901.

b. ♀ imm. Kampong Jalor. 29th October, 1901.

In both of these examples the ground colour is very light, and the three dark dorsal stripes clearly cut and well marked.

11. *Paradoxurus* sp. (?)

a. ♂ juv. Near Ban Sai Kau, Nawngchik. 12th September, 1901.

The above specimen, which is very young, is uniform brownish-grey throughout, except for the head and face which are whitish, especially that portion immediately anterior to the ears. The two fore feet and tail are also white; the ears and a small patch over the anterior half of the eye, dark brown. I am not able, from the material available, to make out its specific identity.

'This specimen was found by our Malays in a nest in a hollow tree, and was said to be the young of a species of which the vernacular name is *Musang tagalung*, and which lives largely on fish. In appearance it closely resembles a specimen associated with an adult *Paradoxurus leucomystax* in the Selangor State Museum, Kuala Lumpur.'

12. Putorius nudipes, F. Cuv.

Putorius nudipes, F. Cuv. *Mamm.* III, p. 149 (1823); Flower, *P.Z.S.* 1900, p. 334.

a. ♂. Kuala Lumpur, Selangor. April, 1902.

13. Lutra cinerea, Illiger

Lutra cinerea, Illiger, *Abb. Akad. Berl.* 1811, p. 99; Flower, *P.Z.S.* 1900, p. 334; Bonbote, *op. cit.* p. 874.

a. ♀. ad. Ban Sai Kau, Nawngchik. 25th May, 1901.

b. ♀. imm. Biserat, Jalor. 13th July, 1901.

Measurements in flesh of the adult:—Head and body, 445 mm.; Tail, 273 mm.; Hind foot, 85 mm.; Ear, 10 mm.

'Otters, probably of more than one species, are common in the Patani States, both high up the rivers, in estuarine waters, and even in Patani Bay, the coast form attaining a very large size. The people of the fishing village of Tanjong Budi, on Patani Bay, told us that the species was polygamous, and that the old dog otter always endeavoured to destroy the male pups, the usual number of a litter being four. It was very abundant in this locality, and was often to be seen along the edge of the mangroves at low tide, or swimming in the waters of the bay. Travelling down the Patani River, above Biserat, in very rainy weather, we surprised a party of four on a shingle bank, who sat up on their hind legs and watched us, rubbing their faces with their paws. Native name, *Brang brang*, or *Anjing ayer* (water dog).'

14. Ursus malayanus, Raffles

Ursus malayanus, Raffles, *Trans. Linn. Soc.* XIII, p. 254 (1822); Flower, *P.Z.S.* 1900, p. 335.

One skin (purchased from natives). Ban Sai Kau, Nawngchik.

'From what we heard the sun-bear was by no means uncommon on the slopes of Bukit Besar, and, on one or two occasions, we came upon fallen tree trunks which had been pulled to pieces in the search for honey and grubs. The species has usually the reputation of being harmless and inoffensive, but in the Patani States, at any rate, it is considered "more wicked than the tiger."'

'In the mountains of South Perak we obtained, through the Sakais, the skull and bones of a very old male, which seems to have attained an exceptional size, but from native testimony (and Malays have a keen zoological instinct) it seems very probable that another species remains to be discovered in the Peninsula, which is perfectly well-known to the natives as the 'bruang bukit' (mountain bear),¹ and which lacks the yellowish-white on muzzle, paws, and breast, which is so characteristic a feature in *Ursus malayanus*.

'By some Malay systematists *Nycticebus* is considered a bear, just as for some occult reason the gibbons are classed as squirrels.'

***Cyon rutilans*, S. Müll.**

'Near Jarum, in the north-west of Rhaman, I disturbed a pack of either five or six hunting dogs, which were resting at mid-day under a large tree, in the centre of an open space overgrown with long grass, and surrounded with thick jungle. The dogs walked off quite slowly into the jungle, at a distance of not more than thirty yards in front of me, and, as I heard from a man who followed me, returned very shortly to continue their siesta under the tree. They were absolutely silent, a fact on which my Malay followers congratulated themselves, it being considered most unlucky, in fact, a certain omen of death, to meet the *srīgāla* (as the Malays call it), if it barks. So far as I could see, the body, head, and limbs of the individuals of this pack were of an almost uniform bright rufous, the hair being rather longer than that of the Malay pariah, but closely resembling that of the Sakai domestic dog; while the tail, which was carried hanging down, was almost entirely black and moderately bushy. The head was held erect, and the animals walked high on their feet. The Malays of Rhaman state that there are two species of *srīgāla* not uncommon in the Jarum district, the larger and redder species—that which I saw—being called *srīgāla bukit* (mountain jackal), and not venturing near the villages, though it always goes about in packs; while the smaller variety, which may very well be a true jackal, goes solitary or in pairs, and frequently steals sickly lambs, kids, or calves. In Nawngchik and Jalor the same two species are said by the natives to occur, coming down in early spring into the plains near the villages.'—N. A.

'On Bukit Besar, on a bright moonlight night at the end of April, we were disturbed, towards dawn, by a hideous yelping and yelling, probably produced by a large pack of hunting dogs. It passed along close to our hut and then came to a standstill, continuing for some time, some distance away in the jungle; and on several succeeding occasions we heard the sound about the

1. In Hulu Rhaman this hypothetical bear, without the pale markings on the breast, but with spectacled eyes, is known as *bruang anjing* (dog bear) as distinct from the common species, *bruang orang* (man bear), which it is said to exceed in size.—N. A.

same time of night, or rather early morning. The Malays hold the same belief with regard to the urine of the *śrīgāla* as that held by the Ghonds and other Indian tribes regarding that of the dhole (*Cyon rutilans*), viz., that it causes blindness, and that the dogs make use of this quality by urinating against the trunks of trees on which their prey is likely to rub itself.

15. *Tupaia belangeri* (Wagn.)

Cladobates belangeri, *Wagner, Schreb. Saugth. Suppl.* 11, f. 42 (1841).

Tupaia belangeri (Wagner), *Bonhote, P.Z.S.* 1900, p. 192.

a. ♀ ad. Biserat, Jalor. 4th July, 1901.

T. ferruginea is the southern form of this species and, judging by recent collections, it does not appear to go very far north.

16. *Tupaia malaccana*, Anders.

Tupaia malaccana, *Anders. Zool. Res. Yunnan.*, p. 134 (1879).

Tupaia javanica, *Horsf., Flower, P.Z.S.* 1900, p. 336.

a. ♂ ad. Telôm, Perak-Pahang boundary, alt. 4000'. 25th January, 1902.

17. *Crocidura murina* (Linn.)

Sorex murinus, *Linn. Syst. Nat.* 1, p. 74 (1766).

Crocidura murina (Linn.), *Flower, P.Z.S.* 1900, p. 337; *Bonhote, loc. cit.* p. 874.

a. ♀ ad. Alor Stah, Kedah. 17th December, 1901.

Although perfectly adult this is a small specimen, being about the same size as the one noted by BLANFORD (*Faun. Brit. Ind. Mamm.*, p. 235 (1888)). The measurements in the flesh were as follows:—Head and body, 97 mm.; Tail, 55 mm.; Hind foot, 18 mm.; Ear, 8 mm.

‘It is probable that this musk shrew is an introduction into the Peninsula, and not an indigene. We never met with it in the Patani States, though it is not a mammal that is likely to escape notice, and if it occurs at all it must be decidedly rare and local. On the other hand, it was extremely common at Kuala Lumpur, where I saw several specimens which were captured under the houses, and it is well-known both in Penang and Singapore. The specimen in the collection was captured by one of our men on the curb of a well in the early morning; it appeared to be quite blind, as it actually ran over his foot. The eyes were very small and almost unpigmented.’

18. *Crocidura fuliginosa* (Blyth)

Sorex fuliginosus, *Blyth, J. A. S. B.* xxiv, p. 362 (1856).

1 ♀ spm. in alc. Biserat, Jalor. 19th July, 1901.

Measurements in the flesh :—Head and body, 74 mm. ; Tail, 63.5 mm. ; Hind foot, 15 mm. ; Ear, 9 mm.

‘The single specimen obtained was found caught by the tail in one of our rat traps, near the entrance of a limestone cave in fairly thick jungle.’

19. *Pteropus vampyrus* (Linn.)

Vespertilio vampyrus, *Linn. Syst. Nat.* 1, p. 31 (1758).

Pteropus edulis (Geoffr.), *Flower, P.Z.S.* 1900, p. 339.

Pteropus vampyrus (Linn.), *Bonhote, P.Z.S.* 1900, p. 875.

a. ♀ ad.	Patani.	15th June, 1901.
b-e. ♀ ad.	Biserat, Jalor.	July, 1901
f. ♂.	Kampong Bayu, nr. Biserat.	9th July, 1901.

‘This big fruit bat, or *kluang*, the largest of all the Chiroptera, is very common in every locality in the Peninsula visited by us. Just before sunset, especially in the fruit season, flights of them are to be seen making their way to the nearest orchard, where they commit great depredations. The line of flight is very direct and usually at a great height, and appears curiously deliberate and raven-like, though the pace at which they travel is really considerable. We noticed them in immense numbers in the estuary of the Klang River, and they were also very numerous on Bukit Besar during our second visit in September, 1901. Some Siamese eat them readily, though no Malay would touch them.’

20. *Cynopterus sphinx* (Vahl)

Vespertilio sphinx, *Vahl, Scrivten af Naturhistorie-Selskabet* 4te Bind, 1ste Heft p. 123 (1797).

Cynopterus marginatus (Geoffr.), *Flower, P.Z.S.* 1900, p. 349 ; *Bonhote, loc. cit.* p. 875.

♀.	Patani.	17th June, 1901.
2 ♀.	Biserat, Jalor.	7th July, 1901.

Several specimens in alcohol from Biserat and from the Batang Padang district, South Perak.

‘Very common in the houses wherever we went. The specimen from Patani was shot hanging to the under surface of the mid-rib of a cocoanut palm.’

21. Cynopterus ecaudatus (Temm.)

Pachysoma ecaudatum, Temm. *Mon. Mamm.* II, p. 94 (1839).

Megaera ecaudata, Temm. *Mon. Mamm.* II, p. 359 (1841).

Megaerops ecaudatus (Temm.), Matschie, *Megachir. Berl. Museum*, p. 79 (1899).

Cynopterus ecaudatus (Temm.), Dobs. *Cat. Chir. Brit. Mus.* p. 87 (1878).

a. ♀ ad. in alc. Bidor, South Perak. January, 1902.

Very few specimens of this rare bat have hitherto been obtained. The type was procured at Padang, Sumatra, and the remaining few examples known (with the exception of the present one) have all come from Borneo. This species differs from the other members of the genus *Cynopterus* by having only two incisors in the lower jaw.

Measurements of the above specimen:—Head and body, 78 mm.; Forearm, 53 mm.

The total absence of the tail, the long nostrils, short muzzle, and presence of but two incisors in the lower jaw, enable this species to be easily recognized.

‘Shot under the eaves of the rest-house, Bidor.’

22. Macroglossus minimus (Geoffr.)

Pteropus minimus, Geoffr., *Ann. Mus.* xv, p. 97 (1810).

Carponycteris minima (Geoffr.), Flower, *P.Z.S.* 1900, p. 341.

Kiodotus minimus (Geoffr.), Bonhote, *P.Z.S.* 1900, p. 875.

a. ♀ ad. Patani. 22nd April, 1901.

23. Rhinolophus affinis, Horsf.

Rhinolophus affinis, Horsfield, *Zool. Res. Java* (1824); Miller, *Proc. Acad. Nat.*

Sci. Philad. 1898, p. 319; Flower, *P.Z.S.* 1900, p. 342.

1 spm. in alc. Biserat, Jalor. 16th July, 1901.

The forearm of this specimen measures exactly 50 mm.

24. Rhinolophus malayanus, sp. nov.

Nearly allied to *R. affinis*, Horsf., but much smaller, only slightly exceeding *R. minor*, Horsf., in size.

Ears sharply pointed, and when laid forward reach to the extremity of the muzzle. The outer margin is concave immediately below the tip, and then slightly convex and separated from a large antitragus by a deep notch.

The horseshoe, which is moderately broad and sharply cleft in front, is large enough just to conceal the nostril anteriorly. Sella of moderate width, the erect transverse portion being of equal width throughout its length and

slightly narrower than the horizontal part. The connecting process behind the sella hardly rises above the vertical part of the same and is rounded off. The posterior leaf is of moderate size, the tip elongate, and the margins slightly concave. Lower lip with three vertical grooves. Wing membranes from the ankles; interfemoral membrane nearly straight; only the extreme tip of the tail projects.

Fur moderately long, sepia brown above, lighter beneath.

Dimensions of type:—Head and body, 46 mm.; Tail, 20 mm.; Forearm, 41 mm.; Ear (from base of antitragus to tip), 14 mm.; Tibia, 16 mm.; Greatest width of horseshoe, 8 mm.; Length from tip of posterior leaf to anterior edge of horseshoe, 13 mm.; Total expanse, 227 mm.

Habitat. Biserat, Jalor.

Type. Adult female in spirit collected on the 8th August, 1901.

There are some specimens in the British Museum collected by Signor L. FEA in the Karin Hills, Burmah, and recorded by THOMAS,¹ under the name *R. affinis rouxi*² (TEMME.) These specimens, though slightly larger and somewhat more rufous in body colour, belong undoubtedly to the species just described, or are, at most, only subspecifically distinct. As regards the name *rouxi*, TEMMINCK states that it is a bat similar in all respects to *R. affinis*, and gives the length of the forearm as '1 pouce, 10 lignes,' or 50 mm. HORSEFIELD's type from Java has a forearm of 49.5 mm.; there can, therefore, be little doubt that TEMMINCK's *rouxi* is a synonym of *affinis*.

The present species may be at once distinguished from *R. affinis* by its smaller size, and from *R. minor* by the shape of the connecting process between the sella and the posterior leaf, which, in this latter species, ends in a point well above the vertical portion of the sella.

Rhinolophus spadix, Mill. (Proc. Wash. Acad. Sci. III, p. 136 (1901)) from Sirhassen Id. is closely allied to this species.

25. *Rhinolophus minor*, Horsf.

Rhinolophus minor, Horsfield, Zool. Res. Java (1824); Flower, P.Z.S. 1900, p. 342.

2 spms. in alc. Biserat, Jalor. 8th August, 1901.

26. *Hipposiderus armiger*, (Hodgs.)

Rhinolophus armiger, Hodgson, J. A. S. B. IV, p. 699 (1835).

Hipposiderus armiger (Hodgs.), Flower, P.Z.S. 1900, p. 342; Bonbote, loc. cit., p. 875.

a. ad. Biserat, Jalor.

1. Thomas, *Viaggio di Leonardo Fea*, p. 15, Genoa, 1892.

2. Temminck, *Mon. Mamm.* II, p. 306 (1835).

27. *Hipposiderus larvatus* (Horsf.)

Rhinolophus larvatus, *Horsfield, Zool. Res. Java* (1824).

Hipposiderus larvatus (Horsf.), *Miller, Proc. Acad. Nat. Sci. Philad.* 1898, p. 319; *Flower, P.Z.S.* 1900, p. 343.

1 spm. in alc. Biserat, Jalor. 10th August, 1901.

28. *Hipposiderus bicolor* (Temm.)

Rhinolophus bicolor, *Temminck, Mon. Mamm.* 11, p. 18 (1835-41).

Hipposiderus bicolor (Temm.), *Flower, P.Z.S.* 1900, p. 343.

4 spms. in alc. Biserat, Jalor. 10th August, 1901.

29. *Nycteris javanica*, Dobs.

Nycteris javanica, *Dobs. Mon. As. Chir.*, p. 81 (1876); *id. Cat. Chir. Brit. Mus.*, p. 164 (1878); *Flower, P.Z.S.* 1900, p. 345.

1 spm. in alc., imm. Biserat, Jalor. August, 1901.

The occurrence of this specimen confirms BLYTH's statement that the species is found in the Peninsula.

30. *Scotophilus castaneus*¹ (Horsf.)

Nycticejus castaneus, *Horsf. Cat. Mamm. E. Ind. Coll.*, p. 38 (1851).

Scotophilus castaneus (Horsf.), *Bonbote, P.Z.S.* 1900, p. 192.

a, b. 2 ♀. Patani. 22nd April, 1901.

c, d. 2 imm. Patani. 2nd June, 1901.

10 spms. in alc. Biserat, Jalor. June, 1901.

I have previously noted the differences between the present species and *S. kubli*, and this series entirely bears out my former notes. As regards coloration, it is not strictly accurate to state that the under parts are not lighter, for although, as a rule, the colour is very uniform, some specimens are decidedly paler below. The general colour also varies from smoky-brown to bright chestnut.

I can find no description of this bat by GRAY, and it is certainly not in the 'Illustrations of Indian Zoology,' which has been quoted by several authors as containing the original description of the species. It is very closely allied to, if indeed it be not identical with, *S. temminckii* (Horsf.) from Java, but owing to paucity of material the matter cannot be decided at present.

'We found this bat to be the common house bat of the Eastern Malay States. It was exceedingly abundant in the roofs of the houses at Patani, and the specimens from Biserat were obtained in the hollow of the flagstaff facing the government offices.'

1. For an account of the parasites, taken on this and other bats, see Dr. Speiser's subsequent paper on the Diptera Pupipara.

31. Myotis muricola (Gray)

Vespertilio muricola, Gray, *Nat. Mamm. Nepaul. and Thibet*, p. 4 (1846);
Flower, P.Z.S. 1900, p. 347; *Bonhote, loc. cit.* p. 876.

Myotis muricola (Hodgson), *Miller, Proc. Acad. Nat. Sci. Philad.* 1898, p. 321.

1 spm. in alc. Bukit Besar, Nawngchik, 2500'. 1st September, 1901.

'This species was not uncommon on Bukit Besar, especially during our second visit in August and September. It appeared in great numbers in the half-hour preceding sunset, flying very much in the manner of the common British serotine. In the jungle it was frequently to be seen up to about 10 a.m., but during the daytime it retired to the young rolled-up leaves of musaceous and zingiberaceous plants, from which the individual recorded above was obtained.'

32. Emballonura peninsularis, Miller

Emballonura peninsularis, *Miller, Proc. Acad. Nat. Sci. Philad.* 1898, p. 328.

4 spms. in alc. Jeram Kawan, South Perak. 15th February, 1902.

As these specimens are practically topotypes¹ of Mr. MILLER's species, I have placed them under that name. According to Mr. MILLER, it is most nearly allied to *E. monticola*, Temm., from Java.

33. Taphozous longimanus, Hardwicke

Taphozous longimanus, *Hardwicke, Trans. Linn. Soc.* xiv, p. 535 (1823);
Flower, P.Z.S. 1900, p. 349.

a, b. ♂. Biserat, Jalor. 15th July, 1901.

'A cave species.'

Petaurista nitida, Desm.

'We were disappointed at not securing any specimen of flying squirrel, all the species of which are very largely nocturnal in their habits; one of a uniform foxy-red, which may be supposed to belong to this species, was shot at Sungkei, but stuck in the fork of a tree and could not be retrieved.'

34. Ratufa bicolor (Sparrm)

Sciurus bicolor, *Sparrm. Götth. Vet. Svensk. Handl.* i, p. 70 (1778).

Ratufa bicolor (Sparrm.), *Flower, P.Z.S.* 1900, p. 354; *Bonhote, Ann. Mag. Nat. Hist.* (7) vol. v, 1900, p. 493; *Id. P.Z.S.* 1900, p. 876.

Ratufa melanopepla, *Miller, Proc. Wash. Acad. Sci.* ii, p. 71 (1900).

a-c. ♂. Neighbourhood of Biserat, Jalor. July and August, 1901.

1. Jeram Kawan is, however, over two hundred miles from Trang, the type locality of the species. *Edd.*

I have very carefully compared these specimens with a series in the Museum from Java and Sumatra, as well as with a paratype of Mr. MILLER's *R. melanopepla*. Mr. MILLER states (*loc. cit.*) that *R. melanopepla* differs from true *R. bicolor* 'in the clear black of the upper parts,' which is by no means a constant feature, and I can match these individuals exactly with Javan specimens. Nevertheless, from what we already know of the variability of members of this group, I should not be surprised that, on comparison with a large series from Java, the Malay form should turn out to be distinct.

'Although only a few specimens were obtained, this giant squirrel, which is known locally as *Grabok*, is fairly common in Jalor, in the neighbourhood of Biserat, where it usually frequents the jungle, keeping to the topmost branches of lofty trees and taking a very heavy charge of shot to bring down. When the fruit is ripe it is often to be found in the orchards surrounding the villages, being like nearly all animals, from the tiger downwards, exceedingly fond of durians. In no instance did we observe any specimen of the fawn-coloured forms on the Eastern side of the Peninsula, although one or two were noticed in the high jungle near Sungkei, South Perak.'

35. *Sciurus hippurus*, Is. Geoffr.

Sciurus hippurus, Is. Geoffr. *Etudes Zool.* No. 6 pl. 6 (1832); *Anders. Zool. Res. Yunnan*, p. 241 (1879); *Flower, P.Z.S.* 1900, p. 356.

a. ♀ ad. Sungkei, South Perak. 10th February, 1902.

The occurrence of *S. hippurus* and *S. erythraeus* in the Peninsula proves the former to be a distinct species, and not merely the southern representative of the latter, as has been suggested.

'This was the only specimen seen, and was shot running along a fallen tree in deep jungle.'

36. *Sciurus erythraeus*, Pall.

Sciurus erythraeus, Pallas, *Glires*, p. 337 (1778); *Flower, P.Z.S.* 1900, p. 356; *Bonhote, loc. cit.*, p. 877; *id. Ann. Mag. Nat. Hist.* (7) III, p. 161 (1901).

a. ♂. Gunung Semangko, borders of Pahang and Selangor, alt. 4000'. 10th May, 1902.

The further occurrence of this species in the Malay Peninsula renders it certain that its range extends considerably further south than was formerly supposed, but possibly it is confined to the hills. In appearance this specimen most nearly approaches *S. erythraeus typicus* from Assam; the red tail is, however, lacking, being alternately ringed with black and rufous, and the rufous is more strongly developed on the head than elsewhere.

'From the fact that the only two specimens known from the Malay Peninsula have both been procured at altitudes exceeding 4000', it is, I should say, almost certain that the species in this region is a purely mountain form. Parallel instances occur among the birds, for such species as *Mesia argentaureis*, *Siva sordidior*, and *Brbinga remifer*, all forms of an Himalayan facies, are rarely, if ever, seen below an altitude of 3000'.

Sciurus finlaysoni, Horsf.

'On Bukit Besar Mr. ANNANDALE saw a party of four individuals of a species about the size of *S. concolor*, one of which was pure white, while the others were bright foxy-red. Afterwards, at the base of the hill, we examined two specimens in the possession of the Siamese magistrate of the district. One of these was bright red, but the other was pure white, with the iris pink, and the nails and skin devoid of pigment—in fact, the specimen was undoubtedly an albino.'

As a rule, white specimens of this species are not albinos, having black eyes and very dark nails.

37. Sciurus concolor, Blyth

Sciurus concolor, Blyth, *J. A. S. B.* xxiv, p. 274 (1855); Bonhote, *Ann. Mag. Nat. Hist.* (7) vii, p. 272 (1901).

Sciurus caniceps, Gray, *Flower*, *P.Z.S.* 1900, p. 356; Bonhote, *loc. cit.*, p. 877.

a.	♀.	Patani.	16th June, 1901.
b, c.	♂, ♀.	Patani.	16th and 19th June, 1901.
d-h.	♂, ♂.	Biserat, Jalor.	July, 1901.
i-m.	♀, ♀ imm.	Biserat, Jalor.	July, 1901.
n.	♀.	Biserat, Jalor.	10th August, 1901.
o-p.	♂ imm.	Biserat, Jalor.	October, 1901.
q.	♂.	Anak Bukit, Nawngchik.	25th April, 1901.
r.	♀.	Bukit Besar, do. 2500'.	2nd September, 1901.
s-v.	♂ imm.	Ban Sai Kau, Nawngchik.	September, 1901.
w.	♀.	Ban Sai Kau, Nawngchik.	19th May, 1901.
x.	♂.	Kuala Lumpur, Selangor.	October, 1900.

This series shows very little variation; most of the specimens are in their dullest pelage, but in a few the brown colour of the back is much more intense, though the annulations on the hairs are always plainly visible. The brightest specimens are all females, which would, therefore, appear to keep in their bright dress later than the males. The young are dull in colour, resembling their parents in their duller pelage.

'This species is emphatically the village squirrel of the Patani States, and it is very exceptionable to find it otherwise than in the immediate proximity of dwellings. It is exceedingly abundant in the cocoanut groves and orchards, and commits great ravages among the fruit, being particularly destructive to the jack fruit or nangka (*Artocarpus integrifolia*). It is commonly seen on the trees in the early morning, up till about 9 a.m., and after about 4 p.m., and in the heat of the day remains hidden in the crowns of the palms, where it also forms nests similar to the *drey* of the British species. In South Perak, if it occurs, it must be very rare, and we never saw a specimen, but in the neighbourhood of Kuala Lumpur it, or a closely allied species, is fairly abundant. An entirely black variety was seen at Biserat on several occasions.'

Mr. ANNANDALE also notes:—'On the upper reaches of the Patani River, the village squirrel was an almost uniformly grey species. A grey species very similar in appearance extended also, as far as I could see, from Lampam, in Patalung, to Trang, though it was absent, or very rare, in the Jarum district and in Upper Perak.'

38. *Sciurus maclellandi leucotis* (Temm.)

Tamias leucotis, Temminck, *Zool. sur la côte de Guinée*, p. 252 (1853).

Sciurus maclellandi, (Horsf.) *Flower, P.Z.S.* 1900, p. 357.

Sciurus maclellandi leucotis, Bonbote, *Ann. Mag. Nat. Hist.* (7) v, p. 53 (1900).

a-c. 2 ♂, ♀. Telôm, Perak-Pahang boundary, alt. 4000'. January, 1902.

d, e. ♂, ♀. Semangko Pass, Selangor, alt. 2700'. 10th May, 1902.

'This beautiful little species was not met with on the Eastern side of the Peninsula. In Perak and Selangor it is certainly a mountain form, and I do not think that it occurs much below 3000'. It was very common at Telôm, and was also very abundant on the mountains round the Semangko Pass. It is very largely an insectivorous species, and seems to keep chiefly to the trunk and main branches of the trees, running along them with its tail pressed close against the bark.'

39. *Sciurus tenuis surdus*, Miller

Sciurus tenuis surdus, Mill. *Proc. Wash. Acad. Sci.* 11, p. 80 (1900).

Sciurus tenuis, (Horsf.) *Flower, P.Z.S.* 1900, p. 357; Bonbote, *loc. cit.*, p. 878.

a-d. ♂, 3 ♀. Bukit Besar, Nawngchik, 2500'. May, 1901.

e-g. ♂. Bukit Besar, Nawngchik, 2500'. 26th August and 1st September.

h, i. ♀. Bukit Besar, Nawngchik, 2500'. 31st August and 1st September.

k, l. juv. Bukit Besar, Nawngchik, 2500'. 27th August.

m-q. 4 ♂, ♀. Telôm, Perak-Pahang boundary, alt. 4000'. January, 1902.

r. ♂. Semangko Pass, Selangor, alt. 2700'. 13th May, 1902.

I have assigned Mr. MILLER's name to these specimens as they are certainly somewhat duller than specimens from further south. At the same time, there are, in the British Museum, some bright specimens from Perak, so that the difference would appear to me to be rather individual than geographical or seasonal, but much larger series than I have at my disposal would be required before pronouncing a definite opinion.

'This is also a jungle species, and, as far as our observation goes, is not found in low country; wherever found it appears to be abundant, its habits being very similar to those of the preceding species. On Bukit Besar, in August, a nest was found in a clump of birds-nest fern growing on a tree-trunk some forty feet above the ground. The nest consisted of a globular chamber some four or five inches in diameter, and was lined with fine black vegetable fibre. It was approached by a slanting tunnel, and contained either two or three young ones, which were nearly half-grown.'

40. *Sciurus prevosti humei*, Bonh.

Sciurus prevosti humei, Bonhote, *Ann. Mag. Nat. Hist.* (7) VII, p. 170 (1901).

Sciurus prevosti, (Desm.) Flower, *P.Z.S.* 1900, p. 358.

a. ♂ ad. Sungkei, South Perak. 9th February, 1902.

A very typical example of the Malay race.

'A pair were shot for us by the Malay Pengghulu of Sungkei, who was a keen naturalist, and to whom we were indebted for much assistance in the way of collecting. Large numbers are always on sale in the bazaars of Singapore, but appear principally to belong to the Sumatran race.'

41. *Sciurus vittatus*, Raffles

(Plate IV, fig. 7)

Sciurus vittatus, Raffles, *Trans. Linn. Soc.* XIII, p. 259 (1822).

Sciurus notatus, (Bodd.) Flower, *P.Z.S.* 1900, p. 358; Bonhote, *loc. cit.*, p. 878.

Sciurus notatus miniatus, Mill. *Proc. Wash. Acad. Sci.* II, p. 79 (1900).

Sciurus vittatus typicus, Bonhote, *Ann. Mag. Nat. Hist.* (7) VII, p. 447 (1901).

a.	♀.	Bukit Besar, Nawngchik, 2500'.	7th May, 1901.
b.	♂.	Bukit Besar, Nawngchik, 2500'.	26th August, 1901.
c.	♂.	Jambu, Jhering.	7th June, 1901.
d-g.	♂, 3 ♀.	Gedong, Batang Padang, South Perak.	January, 1902.
h, i.	♀.	Sungkei, Batang Padang, South Perak.	7th and 8th February, 1902.
k.	♀.	Kuala Lumpur, Selangor.	27th October, 1900.

This series shows hardly any variation; the colour of the under parts is practically the same in all the specimens, the difference, if there be any, is a tendency among those from the Eastern States (Jalor and Jhering) to become

slightly lighter. Referring to a note¹ of Messrs. STONE and REHN in a recent paper on the red tip to the tail, this is not a *conspicuous* feature in the individuals of the present series, but the annulations of the hairs of the tip are red, although the colour does not spread throughout the whole length of the hair.

'The habits of this squirrel in different parts of its range are of considerable interest; in Perak, and also in Selangor, it is the common village squirrel, being abundant actually within the town of Kuala Lumpur, and also frequenting low country jungle, though it was not found by us at any elevation on the Western side of the Peninsula. On the East Coast, on the other hand, we never met with it near a village, nor, with a single exception, which was shot among the casuarinas on the sea-coast, did we come across it, except at a considerable elevation on Bukit Besar, where, together with the succeeding species, it was very common, though difficult to secure, as it only appeared for a short time in the early morning and late afternoon, and then kept to the highest branches of lofty jungle trees.

'Mr. ANNANDALE further notes that in Upper Perak squirrels were not numerous, and the only specimens seen belonged to the present form, which was the dominant species in the Jarum district of Rhaman, and occurred commonly in the villages, at least as far east as Betong.'

42. *Sciurus nigrovittatus*, Horsf.

(Plate IV, fig. 6)

Sciurus nigrovittatus, Horsfield, *Zool. Res. Java* (1824); Bonbote, *Ann. Mag. Nat. Hist.* (7) VII, p. 452 (1901).

Sciurus notatus, (Bodd.) Flower, *P.Z.S.* 1900, p. 358; Bonbote, *op. cit.*, p. 878.

a-c. 3 ♂ (1 imm.).	Bukit Besar, Nawngchik, 2500'.	May, 1901.
d, e. ♂, ♀ ad.	Bukit Besar, Nawngchik, 2500'.	28th August, 1901.
f. ♀.	Bukit Besar, Nawngchik, 2500'.	3rd September, 1901.
g. ♀.	Gedong, Batang Padang, South Perak.	10th January, 1902.
h. ♀.	Telôm, Perak-Pahang boundary, alt. 4000'.	22nd January, 1902.

Specimens from the Eastern States have the red on the face and throat very well marked, and produced, in some cases, into a narrow ventral line, an inch or more in length.

When I wrote my paper dealing with this group, the skulls at my disposal were so fragmentary that a thorough description and comparison of the cranial differences between this species and the foregoing was impossible.

1. Stone and Rehn, *Proc. Acad. Nat. Sci. Philad.* 1902, p. 132.

The skulls of the two species are easily distinguishable; that of the present species being larger and more robust.¹ The nasals are longer and broader at their anterior extremity, and the muzzle slightly more compressed laterally, especially noticeable when viewed from the under side. The postorbital processes are shorter and stouter, and do not taper to such a fine point. The most conspicuous and easily seen difference, however, is in the posterior nares, which, in the present species, are much broader and practically uniform in breadth throughout their length, whereas in *Sc. vittatus*, apart from being always narrower, they tend to contract posteriorly.

I append the average measurements of a series of six skulls of *nigrovittatus*, as compared with a series of eight of *vittatus* :—

	Greatest Length	Length of palate from hensation	Zygomatic breadth	Interorbital breadth	Length of nasals	Greatest breadth of post. nares
<i>Sc. nigrovittatus</i> .	50.7 mm. (48-52)	21.5 (23-20)	31 (29-32)	17 + (17-18)	15.2 (14-16)	5.6. (5.5-6)
<i>Sc. vittatus</i>	48.5 mm. (48-49)	20.8 (20.5-21)	28.8 (28-29)	17 + (17-18)	13.5 (13-14)	4.3. (4-5)

'In the East Coast States this species occurs under precisely the same conditions as *S. vittatus*, but in Perak, so far as our observation goes, it is never found in the villages and ranges higher up the mountains. A specimen shot at Telôm seemed to us a bulkier, more heavily built, animal, though there was little real difference in the measurements.'

43. *Sciurus robinsoni* sp. nov.

(Plate I).

General appearance similar to *Sciurus lowii*, Thos., from Borneo, but rather smaller.

Colour above a uniform grizzled black, and rufous becoming rather greyer and lighter on the flanks and sides of the face. Each hair is dark at its base, and has one or more rufous annulations and a black tip. Under parts and inner sides of the limbs buffy white, with a tendency to rufous on the hind limbs. Ears short and covered with short hairs similar in colour to the back. Muzzle, and a narrow stripe under the eye, fulvous. Tail above, similar in colour to the upper parts, but with light tips to the hairs, below rufous.

Skull. Similar in general shape and conformation to that of *S. lowii*, but much smaller, and the muzzle relatively rather shorter and narrower. On the under side the bony palate extends well back beyond the last molar, which is not the case with *S. lowii*, and the bullae are more flattened and rounded, and do not project so far downwards. The molar series is very much shorter and smaller, but the incisors are about the same size.

1. This exactly controverts the conclusion I came to before. My former remarks were, however, chiefly based on imperfect Javan skulls, whereas these must be considered as applying to the Mainland race.

Dimensions of type (measured in the flesh):—Head and body, 130 mm.; Tail, 95 mm.; Hind foot, 28 mm.; Ear, 12 mm.

Skull. Greatest length, 35 mm.; Basal length, 28 mm.; Length of palate from henselion, 15 mm.; Length of molar series, 5.5 mm.; Zygomatic breadth, 21.5 mm.; Interorbital breadth, 11 mm.; Length of ansals, 10 mm.

Habitat. Bukit Besar, Nawngchik, 2500'.

Type. Adult female, collected on the 30th August, 1901. Original number, 136.

The size of this squirrel suffices to distinguish it at once from *Sc. lowii*, the only species with which it might be confounded. In colour it is rather paler and lacks the warm tinge. One specimen only was obtained, so that it would not appear a very common species, though possibly occasionally confused with *Sc. tenuis*, from which it may be at once distinguished by the colour of the under parts. That another species of Bornean facies should occur on the Peninsula is by no means surprising, and we may soon expect to find most Bornean species with their Malay representatives.

'In the field this species might certainly be readily confounded with *Sc. tenuis*, but I find that this specimen is noted in my journal as possibly distinct.'

44. *Funambulus insignis jalorensis* subsp. nov.

Funambulus insignis (Cuvier) *Bonbote*, *P.Z.S.* 1900, p. 878.

When working out the 'Skeat' collection I noted that the single specimen sent home differed from those hitherto described, and the advent of two more specimens exactly resembling it leave no doubt of the existence of a distinct race from the Eastern side of the Peninsula.

Differs from *S. insignis* of Sumatra in its much greyer coloration, the only rufous parts being the shoulders and thighs. The dorsal stripes are black and well marked, the centre one reaching as far as the back of the crown of the head. Under parts pure white, except the inside of the thighs, which are yellowish.

Skull. The skull is rather more slender than those from the West Coast of the Peninsula, and may be most easily recognized by the nasals, which are slightly shorter and taper off posteriorly to a much greater extent. The series of skulls is so imperfect that it is not possible to give a fuller description.

Dimensions of type (measured in the flesh):—Head and body, 183 mm.; Tail, 98 mm.; Hind foot, 38 mm.; Ear, 10 mm.

Habitat. Bukit Besar (Jalor'), 2500'.

1. Strictly speaking the side of Bukit Besar on which we collected is not in Jalor, but in the neighbouring petty State of Nawngchik. The boundary, however, was said to run along the crest of the hill barely half-a-mile from our encampment. *Edd.*

Type. Adult male, collected on the 9th May, 1901. Original number, 9.

The grey colour forms a very conspicuous difference by which this race may be readily recognized. Specimens from the West Coast do not appear to differ from those found in Sumatra. A second specimen was procured from the same locality in August.

Dimensions of skulls compared with one from the West Coast.

	Greatest length	Palatal length	Length of nasals	Least width of nasals	Zygomatic breadth	Interorbital breadth
Type of <i>jalorensis</i>	50 mm.	21 mm.	15 mm.	3 mm.	27.5 mm.	14
Co-type „	49.5 mm.	20 mm.	15 mm.	4 mm.	27.5 mm.	14.5
Spm. from W. Coast ...		21.5 mm.	15.5 mm.	4.5 mm.	29 mm.	16

‘Almost purely terrestrial in its habits; of the two specimens in the collection, one was shot on the ground and the other caught in a trap baited with melon rind.’

45. *Mus cremoriventer*, Miller

Mus cremoriventer, Miller, *Proc. Biol. Soc. Wash.* XIII, p. 144 (1900).

- a.* ♂ ad. Bukit Besar, Nawngchik, 2500'. 4th September, 1901.
b. ♂ ad. in alc. Bukit Besar, Nawngchik, 2500'. 18th May, 1901.

I have compared these specimens with some paratypes kindly lent me by Mr. MILLER, and with which they perfectly agree.

‘These two specimens were trapped in the jungle with traps baited with melon rind, whereas *Mus bukit* came into our hut and were caught by the cook in the rice-bags.’

46. *Mus surifer*, Miller

Mus surifer, Mill. *Proc. Biol. Soc. Wash.* XIII, p. 149 (1900).

- a-d.* 2 ♂, 2 ♀. Goah Tanah, Bukit Tapang, Biserat, Jalor. July, 1901.
e. ♀. Goah Tanah, Bukit Tapang, Biserat, Jalor. 10th July, 1901.
f. ♂. Bukit Besar, Nawngchik (at foot of hill). 17th September, 1901.
g. ♀. Jeram Kawan, South Perak. 15th February, 1902.
h. ♀ in alc. Biserat, Jalor. July, 1901.

This series, which is slightly duller in colour, shows less black on the back than a series of paratypes forwarded to me for comparison by Mr. MILLER. The species seems to be very largely an inhabitant of caves. The specimen brought home by the ‘Skeat’ expedition, and referred by me to *Mus cremoriventer*, belongs to the present species. Apart from other differences, *Mus cremoriventer* is much smaller and has a uniformly brown tail.

As pointed out by Mr. MILLER, the species bears a very close resemblance to *Mus rajab*, THOS., from which it only differs in external appearance by its smaller size. The skull, however, apart from its size, has a much more slender rostrum.

47. *Mus bukit*, Bonhote.

(Plate IV, fig 2).

Mus bukit, Bonhote, *Ann. Mag. Nat. Hist.* (7) XI, p. 125 (1903).

Similar in appearance to *Mus cremoriventer*, MILLER, and *Mus kina*, BONH., but larger than either.

General colour of a uniform pale ochreous, intermixed with short black hairs, which are nowhere so prominent as to unduly predominate. Sides paler and greyer, caused by an absence of black hairs and general shortness of fur, which enables the light-coloured spines to show through. Under parts yellowish-white, sharply defined from the colour of the upper parts. Feet with dark-brown centres and light toes and margins. Tail rather longer than the head and body, markedly bicolor and scantily clad with hairs.

Skull. Intermediate between those of *M. rapit* and *M. kina*. In size it approaches most nearly to that of *M. rapit*, but the muzzle is considerably shorter and broader in proportion, and the auditory bullae are larger. The anterior zygoma root is very large and solid, greatly exceeding in size that of *M. rapit*. The nostrils are long and taper greatly towards their posterior end. The supraorbital ridges are well marked, and extend right backwards to the posterior margin of the parietals. The bullae are large and well developed, but lie rather flatter than in *M. kina*.

Dimensions of the type (measured in the flesh):—Head and body, 121 mm.; Tail, 148 mm.; Hind foot, 24.5 mm.; Ear, 17 mm.

Skull. Greatest length, 37 mm.; Basal length, 28 mm.; Palatal length, 16 mm.; Diastema, 9.5 mm.; Length of incisive foramina, 6 mm.; Length of nasals, 15 mm.; Zygomatic breadth, 18 mm.; Interorbital breadth, 6 mm.; Greatest breadth of brain case, 15 mm.; Length of molar series, 6.5 mm.

Habitat. Bukit Besar, Nawngchik, 2500'.

Type. Adult male, collected 10th May, 1901. Original number, 11.

The series brought home by Messrs. ROBINSON and ANNANDALE, consisting of two males and three females, is very uniform, and presents no individual variation, whilst, at the same time, they exactly agree with several specimens sent home from Siam by Mr. LYLE, and recorded by me as *Mus jerdoni*¹. I have thought it well to name this species, though subsequent investigations may prove it to be a synonym of *M. jerdoni*.

The specimen of *Mus pellax* in the British Museum is practically a topotype of *M. jerdoni*, but, as I have stated elsewhere, until the skin and skull of BLYTH'S *M. jerdoni* can be closely compared with specimens of *M. pellax* and *M. bukit*, the matter cannot be definitely settled. The skulls, however, of these last two species being so distinct there should be no difficulty in deciding the question, even though the type is young.

48. *Mus rufescens*, Gray.

(Plate IV, fig. 3).

Mus rufescens, Gray, *Charlesw. Mag. Nat. Hist.* 1, p. 585 (1837); *Bonhote, P.Z.S.* 1900, p. 878.

Mus rattus, (Linn.), *Flower, P.Z.S.* 1900, p. 361.

a, b. ♂, ♀ ad. Biserat, Jalor. 4th July, 1901.

In external appearance these specimens agree well with the most common form of the *rattus* group found in the Peninsula; the skull, however, is distinguished by having very small teeth. As, however, I find a certain amount of variability in the size of the teeth in a series from Siam and the Peninsula, I presume it is merely a question of individual variation.

49. *Mus jalorensis*, sp. nov.

(Plate II, figs. 1 and 2, and Plate IV, fig. 4).

A medium sized short tailed rat of the *Mus rattus* group.

Fur moderately long and soft, thickly interspersed with very slender spines. General colour warm grizzled brown, becoming greyer on the flanks. Each hair is ashy-grey at the base with a broad brownish tip, the spines are whitish with a black tip, and there are also some long black hairs. Under parts pure white, sometimes with a slightly yellowish tinge, the line of demarcation between the upper and under parts being well marked. Feet, dark brown. The tail hardly exceeds the head and body in length, and is uniformly dark throughout, and scantily clothed with very short stiff hairs.

Skull. Similar to that of *Mus rufescens* from the Malay Peninsula, but smaller and narrower. The nasals taper greatly towards their posterior end. The supraorbital ridges end altogether or become inconspicuous about the middle of the parietals. Viewed from below, except for being narrower and more slender, the skull does not offer any very striking points of difference. The bullae are rather more rounded and do not appear to stand out quite so much from the base of the skull.

Dimensions of type (measured in the flesh :—Head and body, 144 mm.; Tail, 177 mm.; Hind foot, 31.5 mm.; Ear, 19 mm.

Skull. Greatest length, 40 mm. ; Basal length, 32 mm. ; Palatal length, 19 mm. ; Diastema, 11 mm. ; Length of incisive foramina, 7 mm. ; Length of nasals, 14 mm. ; Combined breadth of nasals: Anteriorly, 4 mm. ; Posteriorly, 1.5 mm. ; Zygomatic breadth, 19 mm. ; Interorbital breadth, 6 mm. ; Breadth of brain case at roots of zygomata, 14 mm. ; Length of molar series, 7 mm.

Habitat. Ban Sai Kau, Nawngchik, and in the neighbouring State of Jalor. Also found in Perak and Siam.

Type. Adult female, Ban Sai Kau, Nawngchik, collected on the 11th September, 1901. Original number, 148.

This rat may be easily recognized by its dark and uniform upper surface, short tail, black feet, and white under parts. In *Mus rufescens* the back is much lighter and not so uniform in colour, tail rather longer, and feet white. *Mus rufescens* has also a considerable longer ear.

The series of eight individuals in the present collection is very uniform, and the Museum also contains specimens from Siam, so that it would appear to range from Burmah eastwards.

Series received in present collection.

- a, b.* 2 ♀ ad. Ban Sai Kau, Nawngchik. 11th September, 1901.
(one of these is the type).
c. ♀. Biserat, Jalor. 17th July, 1901.
d-h. 2 ♂, 3 ♀. Telôm, Perak-Pahang boundary, alt. 4000'. January, 1902.

Average measurements compared with *M. rufescens* :—

Mus jalorensis. Head and body, 145 (137-152) mm. ; Tail, 165 (151-177) mm. ; Hind foot, 30 (29.5-31.5) mm. ; Ear, 17.5 (19-17) mm.

Mus rufescens (Siam). Head and body, 170 mm. ; Tail, 184 mm. ; Hind foot, 32 mm. ; Ear, 24 mm.

SKULL	Greatest length	Basal length	Palatal length	Diastema	Length of nasals	Breadth of nasals		Zygo-matic breadth	Inter-orbital breadth	Breadth of brain case	Molar series
						Anterior	Posterior				
	MM.	MM.	MM.	MM.	MM.	MM.	MM.	MM.	MM.	MM.	MM.
<i>M. jalorensis</i> ... (Av. of 7 spms.)	38.5	31.7	18	10.2	13	4	2	18.5	6	14	7
<i>M. rufescens</i> ...	43	34	20	12	16	5	3	20	6.5	15	8

‘Not a house rat ; the Telôm specimens came from deep jungle ; and the others were trapped in the rice-fields.’

50. *Mus griseiventer*, sp. nov.

(Plate II, fig. 3, and Plate IV, fig. 5).

A species of the *Mus rattus* group. Fur soft, short, and close, containing a few slender and scattered spines.

General colour of upper parts very much as in the last species, but rather paler and more uniform in coloration throughout, being hardly, if at all, darker along the centre of the back. Under parts uniform dull grey, with a yellowish tinge caused by fulvous tips to some of the hairs. Feet, dark brown; ears short, naked, and rounded. Tail rather longer than the head and body, of a uniform black throughout, covered with numerous short stiff black hairs.

Skull. Similar to that of *Mus jalorensis*, but longer and narrower. The nasals do not appear to taper quite as much, and the supraorbital ridges are more strongly marked and inclined outwards. The bullae are slightly larger, not converging anteriorly quite as much, and the incisive foramina are also rather narrower.

Dimensions of type (measured in the flesh):—Head and body, 161 mm.; Tail, 212 mm.; Hind foot, 35 mm.; Ear, 19 mm.

Skull. Greatest length, 42 mm.; Basal length, 35 mm.; Palatal length, 20 mm.; Diastema, 12 mm.; Length of incisive foramina, 7 mm.; Length of nasals, 15 mm.; Combined breadth of nasals: Anteriorly, 4 mm.; Posteriorly, 2 mm.; Zygomatic breadth, 19 mm.; Interorbital breadth, 6 mm.; Breadth of brain case at roots of zygomata, 15 mm.; Length of molar series, 7 mm.

Habitat. Bidor, South Perak.

Type. Adult female, collected on the 3rd February, 1902. Original number, 215.

The size of the hind foot and comparative shortness of the ear form two features by which this species may be easily recognized. The uniform dull coloration and grey under parts enable it to be distinguished at a glance from *Mus jalorensis*. The tail in the type appears somewhat longer than that in the remainder of the series.

Four specimens, 2 ♂ and 2 ♀, were brought back, all from the same locality. The average measurements of the four are:—Head and body, 155 mm.; Tail, 177 mm.; Hind foot, 34 mm.

‘A house rat; very abundant in the Bidor rest-house.’

51. *Mus annandalei*, sp. nov.

(Plate IV, fig. 1).

A medium-sized rat, allied to *Mus neglectus*, JENT. Fur soft and moderately long; entirely destitute of spines.

General colour grizzled fulvous, having a slightly darker area from the nose and down the middle of the back. Under parts pure white, somewhat tinged with ochraceous, the line of demarcation not being very distinct. Outer sides of all four limbs greyish-brown, inner sides of fore limbs white, of hind limbs dark brown. Feet dark brown. Tail slightly longer than the head and body, uniform black in colour, and covered with short stiff hairs. Ears somewhat elongated and naked.

Skull. The skull, which is elongated, is chiefly noticeable for the large bullae. The nasals, which are of a fairly level breadth throughout their length, end in a line with the posterior margin of the praemaxillae. The supraorbital ridges, which are not well marked, end about half-way across the parietal. The anterior root of the zygoma bends abruptly outwards about its centre. Viewed from below the most conspicuous features are the audital bullae, which are very large and rounded, compressing the basioccipital and making it narrow.

Dimensions of type (measured in the flesh):—Head and body, 151 mm.; Tail, 196 mm.; Hind foot, 35 mm.; Ear, 17 mm.

Skull. Greatest length, 44 mm.; Basal length, 33 mm.; Palatal length, 19 mm.; Diastema, 11 mm.; Length of incisive foramina, 7.5 mm.; Length of nasals, 16 mm.; Zygomatic breadth, 19.5 mm.; Breadth of brain case at posterior roots of zygomata, 15 mm.; Length of molar series, 7.5 mm.; Length of bullae, 8 mm.; Length between external and internal auditory meatus, 7 mm.; Breadth of basioccipital anteriorly, 8 mm.

Habitat. Sungkei, South Perak.

Type. Adult female, collected on the 8th February, 1902. Original number, 223.

This species must be considered as allied to the *Mus rattus* group, although the large size of the bullae give the skull a very distinct and easily recognizable appearance. Superficially it is somewhat like *Mus validus*, MILL., only considerably smaller; whilst its nearest ally would appear to be *Mus neglectus*, from Borneo.

‘Trapped among old tree stumps near a patch of recently cleared jungle.’

I append a list of names with references to original descriptions and type localities, showing the main groups into which some of these Oriental rats may be classed. The list has no pretence at being complete or exhaustive, but it may, perhaps, by rough subdivision, enable more competent workers to attack and put in order the unwieldy genus *Mus*.

It has been found impossible to divide these species into groups of equal value. In the case of the *Jerdoni*, *Whiteheadi*, *Xanthurus*, and *Rattus* sections, these groups are so subdivided as to have become, for practical purposes, of almost generic value, although showing no characters of sufficient importance to enable them to be generically separated. The remainder are groups of slightly superspecific value, and equal to the subgroups of the more variable forms.

JERDONI GROUP

Moderate sized to large rats ; fur as a rule thickly beset with spines. Colour above, brown or ochraceous, sharply marked off from pure white under parts. Tail long and generally bicolor.

WHITEHEADI GROUP

Similar to above but tail short, and the species all of moderate size. Colour of upper parts not sharply divided from that of lower parts, which are generally of a buffy white.

XANTHURUS GROUP

Large, soft-furred rats of brownish colour above, not sharply divided from that of the under parts, which are lighter in colour, sometimes white. The tail is of moderate length, naked, and *its terminal portion white*.

MUELLERI GROUP

Large grizzled rats with long *black* tail. Under parts white.

BOWERSI GROUP

Large rats of a silvery or brownish-grey colour minutely flecked with white. Tail long, unicolor.

RATTUS GROUP

The large and difficult group of *Mus rattus*, I propose, dealing only with Oriental specimens, to divide into three subgroups, viz. :—*Rufescens*, *Pycoris*, and *Griseiventer*.

(a) Subgroup *Rufescens*

Hairs long, light coloured and yellowish, especially along the flanks, interspersed with longer black ones down the centre of the back. Ears large. Under parts white or yellowish-white. Tail slightly longer than head and body. Average measurements :—Head and body, 170 mm. ; Tail, 184 mm. ; Hind feet, 32 mm. ; Ear, 24 mm. A tree rat.

(b) Subgroup *Pycoris*¹

Hair moderately long and soft ; much darker and more uniform above than *rufescens*. Under parts white. Tail bearing about the same proportion to the head and body as in the former subgroup, possibly rather shorter. Whole animal smaller, especially the ear. Average measurements :—Head and body, 145 mm. ; Tail, 165 mm. ; Hind feet, 30 mm. ; Ear, 21 mm. A hill rat.

1. This is the *nitidus* group of Thomas and various authors ; *Mus nitidus* belongs to my third subgroup, which I have called *griseiventer* to save confusion. The types of both *pycoris* and *nitidus* are in the British Museum.

(c) Subgroup Griseiventer

Larger. Hairs short and close. General colour much more uniform. Under parts grey or yellowish-grey. Tail longer than head and body. Hind foot very large; ear small. Average measurements:—Head and body, 155 mm.; Tail, 177 mm.; Hind feet, 35 mm.; Ear, 19 mm. A house rat.

CHRYSOCOMUS GROUP

Small rats, of a dull uniform colour; tail short, not exceeding the head and body in length. They may most easily be recognized by their very soft, sooty fur.

I have endeavoured, as far as possible, in the following lists, to assign each name to a group, but, in some instances, this has been found impossible, and in others there has been only a very scanty description to go upon. A group has not always been called after the name of the oldest species it contains, but rather after a species which is fully described and can be easily identified.

JERDONI GROUP**Subgroup Edwardsi**

- | | |
|---|--------------------------|
| Mus edwardsi, <i>Thos. P.Z.S.</i> 1882, p. 587. | W. Fokien, China. |
| Mus siporanus, <i>Thos. Ann. Mus. Civ. Genoa</i> , xxxiv, p. 11 (1895). | Isle of Sipora, Sumatra. |
| Mus ciliatus, <i>Bonhote, P.Z.S.</i> 1900, p. 879. | Gunung Inas, Perak. |

Subgroup Sabanus

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|---|------------------------------|
| Mus sabanus, <i>Thos. Ann. Mag. Nat. Hist.</i> (5) xx, p. 270 (1887). | Kina Balu, Borneo. |
| Mus vociferans, <i>Mill. Proc. Biol. Soc. Wash.</i> xiii, p. 138 (1900). | Trang, Lower Siam. |
| Mus lancavensis, <i>Mill. Proc. Biol. Soc. Wash.</i> xiii, p. 188 (1900). | Pulau Lankawi, S. China Sea. |
| Mus strepitans, <i>Mill. Proc. Wash. Acad. Sci.</i> ii, p. 207 (1900). | Anambas Island. |
| Mus fremens, <i>Mill. Proc. Acad. Nat. Sci. Philad.</i> 1902, p. 154. | Sinkep Island. |

Subgroup Jerdoni

- | | |
|---|--------------------|
| Mus pallax, <i>Mill. Proc. Biol. Soc. Wash.</i> xiii, p. 147 (1900). | Trang, Lower Siam. |
| Mus fulvescens, <i>Gray, Cat. Hodgs. Coll.</i> , p. 18 (1846). | Nepal. |
| Mus caudatior, <i>Hodgs. Ann. Mag. Nat. Hist.</i> (2) iii, p. 203 (1849). | Nepal. |
| Mus jerdoni, <i>Blyth, J.A.S.B.</i> xxxii, p. 350 (1863). | Sikkim. |
| Mus coxingi, <i>Swinhoe, P.Z.S.</i> 1864, p. 185. | Formosa. |
| Mus rapit, <i>Bonhote, Ann. Mag. Nat. Hist.</i> (7) xi, p. 123 (1903). | Kina Balu, Borneo. |

Subgroup Niveiventer

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|--|-------------------------|
| Mus bukit, <i>Bonhote, Ann. Mag. Nat. Hist.</i> (7) xi, p. 125 (1903). | Jalor, Malay Peninsula. |
| Mus niveiventer, <i>Hodgs. J.A.S.B.V.</i> p. 234 (1836). | Nepal. |
| Mus confucianus, <i>M. Edw. Nouv. Arch. Mus.</i> vii, p. 93 (1871). | Moupin, China. |

Subgroup Rajah

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|--|-----------------|
| Mus rajah, <i>Thos. Ann. Mag. Nat. Hist.</i> (6) xiv, p. 451 (1894). | Borneo. |
| Mus hellwaldi, <i>Jentink, Notes Leyden Mus.</i> p. 11 (1878). | Celebes. |
| Mus anambae, <i>Mill. Proc. Wash. Acad. Sci.</i> ii, p. 205 (1900). | Anambas Island. |
| Mus lingensis, <i>Mill.</i> " " " p. 206 (1900). | Linga Island. |

Subgroup Rajah—continued

<i>Mus surifer</i> , <i>Mill. Proc. Biol. Soc. Wash.</i> xiii, p. 148 (1900).	Trang, Lower Siam.
<i>Mus flavidulus</i> , <i>Mill.</i> „ „ „ p. 189 (1900).	Pulau Lankawi.
<i>Mus butangensis</i> , <i>Mill.</i> „ „ „ p. 190 (1900).	Butang.

Subgroup Cremoriventer

<i>Mus cremoriventer</i> , <i>Mill. Proc. Biol. Soc. Wash.</i> xiii, p. 144 (1900).	Trang, Lower Siam.
<i>Mus flaviventer</i> , <i>Mill. Proc. Wash. Acad. Sci.</i> ii, p. 204 (1900).	Anambas Island.
<i>Mus kina</i> , <i>Bonhote, Ann. Mag. Nat. Hist.</i> (7) xi, p. 124 (1903).	Kina Balu, Borneo.

WHITEHEADI GROUP

<i>Mus whiteheadi</i> , <i>Thos. Ann. Mag. Nat. Hist.</i> (6) xiv, p. 452 (1894).	Kina Balu, Borneo.
<i>Mus ochraceiventer</i> , <i>Thos.</i> „ „ „ p. 451 (1894).	Kina Balu, Borneo.
<i>Mus musschenbroeki</i> , <i>Jentink, Notes Leyden Mus.</i> p. 19 (1878).	Celebes.
<i>Mus alticola</i> , <i>Thos. Ann. Mag. Nat. Hist.</i> (6) ii, p. 408 (1888).	Kina Balu, Borneo.
<i>Mus bacodon</i> , <i>Thos.</i> „ „ (6) xiv, p. 452 (1894).	Kina Balu, Borneo.
<i>Mus asper</i> , <i>Mill. Proc. Biol. Soc. Wash.</i> xiii, p. 145 (1900).	Trang, Lower Siam.

BOWERSI GROUP

<i>Mus bowersi</i> , <i>Anders. Zool. Res. Yunnan</i> , p. 304 (1879).	Yunnan.
<i>Mus latouchei</i> , <i>Thos. Ann. Mag. Nat. Hist.</i> (6) xx, p. 113 (1897).	Kuatun, China.
<i>Mus ferrocaneus</i> , <i>Mill. Proc. Biol. Soc. Wash.</i> xiii, p. 140 (1900).	Trang, Lower Siam.
<i>Mus berdmorei</i> , <i>Blyth, J.A.S.B.</i> xx, p. 173 (1851).	Mergui.

XANTHURUS GROUP

<i>Mus xanthurus</i> , <i>Gray, P.Z.S.</i> 1867, p. 598.	Celebes.
<i>Mus celebensis</i> , <i>Gray, P.Z.S.</i> 1867, p. 598.	Celebes.
<i>Mus meyeri</i> , <i>Jentink, Notes Leyden Mus.</i> i, p. 12 (1878).	Celebes.
<i>Mus everetti</i> , <i>Gunth, P.Z.S.</i> 1879, p. 75.	Luzon, Philippines.
<i>Mus macleari</i> , <i>Thos. P.Z.S.</i> 1887, p. 573.	Xmas Island.
<i>Mus luzonicus</i> , <i>Thos. Ann. Mag. Nat. Hist.</i> (6) xvi, p. 163 (1895).	Luzon, Philippines.

MUELLERI GROUP

<i>Mus muelleri</i> , <i>Jentink, Notes Leyden Mus.</i> , p. 16 (1879).	Sumatra.
<i>Mus palmarum</i> , <i>Zebebor, Reise der Ost Fregat. Novara, Zool.</i> i, p. 26 (1869).	Nicobars.
<i>Mus validus</i> , <i>Mill. Proc. Biol. Soc. Wash.</i> xiii, p. 141 (1900).	Trang, Lower Siam.
<i>Mus integer</i> , <i>Mill. Proc. Wash. Acad. Sci.</i> iii, p. 111 (1901).	Sirhassen Island.
<i>Mus firmus</i> , <i>Mill. Proc. Acad. Nat. Sci. Philad.</i> 1902, p. 155.	Linga Island.
<i>Mus stoicus</i> , <i>Mill. Proc. U.S. Nat. Mus.</i> xxiv, p. 759 (1902).	Henry Laurence Island, Andamans.
<i>Mus taciturnus</i> , <i>Mill. Proc. U.S. Nat. Mus.</i> xxiv, p. 762 (1902).	S. Andaman Island.

INFRALUTEUS GROUP

<i>Mus infraluteus</i> , <i>Thos. Ann. Mag. Nat. Hist.</i> (6) ii, p. 409 (1888).	Kina Balu, Borneo.
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RATTUS GROUP

Subgroup Rufescens

<i>Mus rufescens</i> , Gray, <i>Charlestown Mag. Nat. Hist.</i> i, p. 585 (1837).	India.
<i>Mus flavescens</i> , Elliot, <i>Madr. Journ.</i> x, p. 214 (1839).	Madras.
<i>Mus brunneusculus</i> , Hodg. <i>Ann. Mag. Nat. Hist.</i> xv, p. 267 (1845).	Nepal.
<i>Mus tetragonurus</i> , Kelaart, <i>Prodromus</i> (1850).	Ceylon.
<i>Mus nemoralis</i> , Blyth, <i>J.A.S.B.</i> xx, p. 168 (1851).	Ceylon.
<i>Mus robustulus</i> , Blyth, <i>J.A.S.B.</i> xxviii, p. 294 (1859).	Tenasserim.
<i>Mus andamanensis</i> , Blyth, <i>J.A.S.B.</i> xxix, p. 103 (1860).	Andamans.
<i>Mus flavipectus</i> , M. Edw. <i>Nouv. Arch. Mus.</i> vii, p. 93 (1871).	Moupin, China.
<i>Mus sladeni</i> , Anders. <i>Zool. Res. Yunnan</i> , p. 305 (1879).	Yunnan.
<i>Mus yunnanensis</i> , Anders. <i>Res. Yunnan</i> , p. 306 (1879).	Yunnan.
<i>Mus vicerex</i> , Bonhote, <i>Ann. Mag. Nat. Hist.</i> (7) xi, p. 473 (1903).	Simla.

Subgroup Pyctoris

(the nitidus group of Thomas, Sclater, and other authors.)

<i>Mus pyctoris</i> , Hodg. <i>Ann. Mag. Nat. Hist.</i> xv, p. 267 (1845).	Nepal.
<i>Mus aquicaudalis</i> , Hodg. <i>Ann. Mag. Nat. Hist.</i> (2) iii, p. 203 (1849).	Nepal.
<i>Mus rubricosa</i> , Anders. <i>Zool. Res. Yunnan</i> , p. 306 (1879).	Yunnan.
<i>Mus neglectus</i> , Jentink, <i>Notes Leyden Mus.</i> 1879, p. 14.	Borneo.
<i>Mus tiomanicus</i> , Mill. <i>Proc. Wash. Acad. Sci.</i> iii, p. 209 (1900).	Tioman Island.
<i>Mus jalorensis</i> , Bonhote, <i>antea</i> , p. 29.	Jalor.

Subgroup Griseiventer

<i>Mus indicus</i> , Desm. (<i>nec</i> Bechst.) <i>Mamm.</i> ii, p. 299 (1822).	Pondicherry.
<i>Mus asiaticus</i> , Gray, <i>Ann. Mag. Nat. Hist.</i> i, p. 585 (1837).	India.
<i>Mus rattoides</i> , Hodg. <i>Ann. Mag. Nat. Hist.</i> xv, p. 267 (1845).	Nepal.
<i>Mus nitidus</i> , Hodg. <i>Ann. Mag. Nat. Hist.</i> xv, p. 267 (1845).	Nepal.
<i>Mus kandianus</i> , Kelaart, <i>Prodromus</i> (1850).	Ceylon.
<i>Mus germaini</i> , M. Edw. <i>Rech. Mamm.</i> , p. 289 (1874).	Pulau Condor.
<i>Mus pannosus</i> , Mill. <i>Proc. Biol. Soc. Wash.</i> xiii, p. 190 (1900).	Butang.
<i>Mus tambelanicus</i> , Mill. <i>Proc. Wash. Acad. Sci.</i> ii, p. 212 (1900).	Big Tambelan Island.
<i>Mus siantanicus</i> , Mill. <i>Proc. Wash. Acad. Sci.</i> ii, p. 210 (1900).	Pulau Siantan.
<i>Mus atratus</i> , Mill. <i>Proc. U.S. Nat. Mus.</i> xxiv, p. 767 (1902).	Barren Island, Andamans.
<i>Mus flebilis</i> , Mill. <i>Proc. U.S. Nat. Mus.</i> xxiv, p. 762 (1902).	Henry Laurence Island, Andamans.
<i>Mus pulliventer</i> , Mill. <i>Proc. U.S. Nat. Mus.</i> xxiv, p. 765 (1902).	Great Nicobar Island.
<i>Mus griseiventer</i> , Bonhote, <i>antea</i> , p. 30.	Perak.

I have been unable to refer the following to either of the three subgroups.

<i>Mus decumanoides</i> , Hodg. <i>J.A.S.B.</i> x, p. 915 (1841).
<i>Mus ceylonus</i> , Kelaart <i>Prodromus</i> , (1850).
<i>Mus infralineatus</i> , Elliot ; Blyth, <i>J.A.S.B.</i> xxxii, p. 348 (1863).

CHRYSOCOMUS GROUP

<i>Mus chrysocomus</i> , Hoffmn. <i>Abh. Mus. Dresd.</i> iii, p. 20 (1887).	Celebes.
<i>Mus ruber</i> , Jentink, <i>Notes Leyden Mus.</i> ii, p. 18 (1879).	New Guinea.
<i>Mus baluensis</i> , Thos. <i>Ann. Mag. Nat. Hist.</i> (6) xiv, p. 454 (1894).	Kina Balu, Borneo.
<i>Mus fratorum</i> , Thos. <i>Ann. Mag. Nat. Hist.</i> (6) xviii, p. 246 (1896).	Rurukan, Celebes.
<i>Mus datae</i> , Meyer, <i>Abh. Mus. Dresd.</i> vii, p. 25 (1899).	Phillipines.

The following six species are very distinct from all those that have gone before as well as from each other. They are merely noted here to show that they have been taken into consideration when making out the above list.

<i>Mus mettada</i> , Gray, <i>Charlsw. Mag. Nat. Hist.</i> i, p. 586 (1837).	Madras.
<i>Mus gleadowi</i> , Murray, <i>P.Z.S.</i> 1885, p. 805, pl. li.	W. India.
<i>Mus blanfordi</i> , Thos. <i>Ann. Mag. Nat. Hist.</i> (5) vii, p. 24 (1881).	S. India.
<i>Mus humei</i> , Thos. <i>P.Z.S.</i> 1886, p. 63, pl. v.	Manipur.
<i>Mus annandalei</i> , Bonhote, <i>antea</i> , p. 30.	S. Perak.
<i>Mus coelestis</i> , Thos. <i>Ann. Mag. Nat. Hist.</i> (6) xviii, p. 248 (1896).	S. Celebes.

I append a few notes to shew the distinguishing characters of some of the species and subgroups.

The **Edwardsi** group are large rats of a dark colour, their fur intermixed with spines of medium stiffness. In *M. edwardsi* and *M. siporanus* the tail is bicolor and has the terminal third white. In *M. ciliatus* it is uniformly dark. In the original description of *M. siporanus* Mr. THOMAS was inclined to consider it as allied to *M. macleari*; a comparison of the skulls, however, clearly shews it to belong to the *Jerdoni* group. I have pointed this out to Mr. THOMAS, who concurs in the view here expressed.

Sabanus group. *M. sabanus* is slightly smaller than the rats in the above group, and lighter in colour, especially about the shoulders. The tail is very long, bicolor, and with the tip white.

Jerdoni group. Smaller and much brighter in colour than individuals of the former groups. The fur in this group is much longer and softer than in all the others, being especially so in *M. fulvescens* and *M. caudatior*, which are synonyms. In *M. coxingi*, however, although the fur is very long it is very thickly interspersed with stiff spines. Tail moderately long and bicolor.

The **Niveiventer** group closely resembles the last, but the fur is shorter and very spiny, especially in the case of *M. niveiventer*, where it is of a dull greyish brown on the back. They are all slightly smaller than the *Jerdoni* group, and the tail is shorter in proportion and bicolor.

The **Rajah** group contains rats slightly paler in colour than those of the *Jerdoni* group. They are intermediate in size, between the *Jerdoni* and *Sabanus* groups, and the fur is thickly beset with spines. Tail only slightly longer than the head and body, bicolor, and white for about an inch at the tip.

The **Cremoriventer** group is composed of smaller rats than the previous ones. Fur light yellow, thickly interspersed with spines. Tail of moderate length, unicolor.

Whiteheadi group. *M. whiteheadi* and *M. asper* are very closely allied. *M. ochraceiventer* is larger, has deep ochraceous under parts, and is much darker above. *Mus alticola* is dark brown above, showing no trace of the fulvous tint; the under parts are dull white.

M. baedon is considerably smaller than *M. whiteheadi*, and has whitish under parts; it also differs in its cranial characters. With the exception of *M. musschenbroeki*, they are all spiny.

Bowersi group. The two specimens from the Hume Collection referred by Mr. THOMAS (*P.Z.S.* 1886, p. 62), to *Mus berdmorei*, BLYTH, resemble *Mus bowersi* so closely, except in size, that I have no hesitation in placing them in the same group. The hind feet of *M. berdmorei* measures 35 mm., and that of *M. bowersi* 52 mm.

Xanthurus group. The differences between the various species have been tabulated by Mr. THOMAS (*P.Z.S.* 1887, p. 573), who also, in his description of *M. luzonicus*, clearly distinguishes it from *M. everetti*.

Muelleri group. This group are large dark coloured rats, with long uniformly black tails. They are all grizzled to a greater or less extent with fulvous; the under parts are, in the case of *M. validus*, of a greyish-white, but in *M. muelleri* itself, yellowish-white.

Mus infraluteus is a fine and distinct species, but allied to the above group in size and cranial characters. It is of a uniform very dark brown above, some of the hairs having light, glistening tips. Under parts with dark grey under fur, and long, light, glistening stiff hairs, of a spiny character.

The divisions into which I have divided the rats of the **Mus rattus** group are, to a large extent, correlated with the habits and situations in which they are found. Those of the *Rufescens* subgroup are tree rats, although in many places they may also be found in houses, and at considerable elevations as well.

The *Pyctoris* subgroup contains hill rats which are not found in low lying land, and *Mus grieventer* represents the true house rat, its chief characters being the large feet, correlated with short ears. The great difficulty to be contended with in this group is the fact of their travelling about on ships, with the result that many varieties and forms occur which cannot be definitely assigned to any of the subgroups, and this has caused a great number of these varieties to be described. One finds, however, as in the case of most small mammals, that in localities away from the direct influence of imported specimens, individuals from any one district are remarkably constant in their characters. In working out this group, reference should be made to the following sources:—

OLDFIELD THOMAS. *P.Z.S.* 1881, p. 521, etc.

W. L. SCLATER. *P.Z.S.* 1890, p. 523.

Cat. Mamm. Ind. Mus., p. 62 (1891).

I have not gone into the Chinese forms of this group with the exception of *M. flavipectus*, which belongs to the *Rufescens* subgroup, differing therefrom only in having the under parts suffused with buffish.

M. vicerex, which I have recently described, is a very well-marked form of *M. rufescens*; its main point of distinction lies in its bicolor tail, which is also well-clothed with moderately long hair. In colour it is a pale-grey form of *M. rufescens*, the long black hairs having a greenish gloss, which, although present in *Rufescens*, is not nearly so conspicuous a feature.

Most of the specimens labelled *M. nitidus* in the Museum belong in reality to *M. pyctoris*, HODGS., which is chiefly to be distinguished by its darker and warmer tints and its longer fur.

I have placed *M. neglectus* in the *Pyctoris* subgroup, as the most typical specimens certainly agree with the main features of that group. The series in the Museum, however, shews a wide range of variation, which, owing to lack of sufficient data, I have not been able to satisfactorily work out. Some specimens closely approach *M. flavipectus*, which undoubtedly belongs to the *Rufescens* subgroup, while others with their large feet and short ears approximate to the *Griseiventer* subgroup, and it is probable that all three subgroups are represented in Borneo.

Mus nitidus, HODGS., which has been confounded with *Mus pyctoris*, is a large rat of the *Mus griseiventer* subgroup, resembling this last in the large feet and the comparatively small ears. On the back the type resembles *M. griseiventer*, except in being rather paler, the under parts being of a dirty yellowish-grey. Other specimens, however, from the same locality, are very much brighter on the back.

Mus germaini from Cochin, China, is another species of the *Griseiventer* subgroup, and except in its more fulvous colour is not unlike *M. nitidus*; the under parts, however, are yellowish white instead of yellowish grey, and the hind feet are also whitish.

I have not had time or material to go carefully into the *Chrysocomus* group, but have placed them together, as they may all be easily recognized by their extremely soft, woolly fur, entirely destitute of spines. The skulls of *M. fratorum* and *M. datae* may be recognized by the long snout, flattened bullae, and large teeth. The skull of *M. baluensis* resembles more closely that of *M. neglectus*, but is somewhat intermediate, having the snout more attenuated and the bullae flatter than in the last named.

52. *Mus concolor*, Blyth.

Mus concolor, Blyth, *J.A.S.B.* xxviii, p. 295 (1859); Flower, *P.Z.S.* 1900, p. 361; Bonhote, *op. cit.*, p. 879.

a.	♀	Bukit Besar, Jalor.	10th May, 1901.
b-e.	3 ♂, 1 ♀	Biserat, Jalor.	3rd July, 1901.
f-i.	3 ♂, 1 ♀	Tojan, Nawngchik.	29th Nov., 1901.
k-m.	3 spms. in alc.	Biserat, Jalor.	July, 1901.

'The common house mouse of the Patani States.'

53. *Mus*, sp.

a. ♀ ad. Jeram Kawan, South Perak, 13th February, 1902.

This mouse is apparently closely allied, if not identical, with *Mus concolor*, but is slightly larger, and owing to the size of the skull I do not feel justified in assigning it to that species.

54. *Rhizomys sumatrensis* (Raffles)

Mus sumatrensis, Raffles, *Trans. Linn. Soc.* XIII, p. 258 (1822).

Rhizomys erythrogenys, Anders. *Zool. Res. Yunnan*, p. 324 (1879).

Rhizomys sumatrensis (Raffles), Flower, *P.Z.S.* 1900, p. 363; Bonhote, *loc. cit.*, p. 881.

a, b.	♀.	Kampong Jalor, Jalor.	4th November, 1901.
c.	♀.	Gedong, Batang Padang, South Perak.	12th January, 1902.

One of the Jalor specimens, while apparently fairly adult, is considerably smaller and darker than the other two. At first sight, small dark coloured examples of this species resemble *R. pruinus*, but they may always be distinguished by the red on the face and the longer tail.

They are possibly referable to *R. erythrogenys*, ANDERS., which, on the material at my disposal, I can only consider as a colour phase of the true *R. sumatrensis*, depending on the individual rather than the locality whence it comes.

'We never met with the bamboo rat ourselves, all our specimens having been brought in by natives. With the larger of the Jalor specimens were four young ones, almost exactly resembling their parent in coloration.'

55. *Hystrix grotei* (Gray)

(Plate III)

Acanthochoerus grotei, Gray, *P.Z.S.* 1866, p. 310; *Sclater, loc. cit.*, p. 417.

Hystrix longicauda (Marsden), *Sclater, P.Z.S.* 1871, p. 234; *Flower, P.Z.S.* 1900, p. 364.

Hystrix yunnanensis (Anders.), *Bonbote, P.Z.S.* 1900, p. 881.

a-c. ♂, ♀ ad. Mabek, Jalor. 27th July, 1900.

d. ♂ imm. (skull only). 27th July, 1900.

The type of *H. grotei*, which is unfortunately a young specimen, and with which I have compared the above, leaves no doubt that these can be referred to that species. The only question about which doubt can exist is as to the advisability of using GRAY's name instead of the *H. longicauda* from Sumatra of MARSDEN¹; MARSDEN gives a plate but no description, and without specimens from Sumatra it is impossible to say whether the Sumatran animal is identical with that of the mainland or not.

GRAY's description of his type agrees well with the adult specimens, but in the skin the nuchal crest is not visible, as the spines forming it are hardly, if at all, longer than those on the surrounding parts, but a few of them have a conspicuous white tip. The narrow lunate half collar under the throat is also well marked in all the specimens.

The skull, which is large, approaches most nearly to that of *H. muelleri*, JENT, from Borneo, but is larger and has a much stouter muzzle. The nasals are long and of fairly uniform width throughout their length, their posterior margin being about level with the hinder edge of the first molar, and being longer than the greatest length of the frontals by about half-an-inch. The praemaxilla is of moderate breadth at its posterior end, which lies about level with the anterior margin of the premolar.

1. Marsden, *Nat. Hist., Sumatra* (3rd ed.), p. 118, pl. xiii (1818)

The measurements are as follows :—Greatest length, 140 mm. ; Henselion to edge of occipital foramen, 113 mm. ; Zygomatic breadth, 72 mm. ; Length of nasals, 61 mm. ; Greatest length of frontals, 51 mm. ; Breadth of nasals at posterior edge of praemaxilla, 30.5 mm. ; Ditto at tip, 23 mm.

It will be noticed that in these specimens the nasals are about 10 mm. longer than the greatest length of the frontals, whereas in *H. yunnanensis*, which was brought back by the 'Skeat' Expedition two years ago, the nasals are 4 mm. shorter than the frontals. I have, however, compared these skulls with that previously identified as *H. yunnanensis*, and consider that they all belong to the same species.

'Porcupines, presumably of this species, must have been exceedingly abundant round Biserat, especially in the caves, the floors of which were covered with innumerable tracks, but no trap that we could obtain proved effectual. The series in the collection were obtained for us by natives, and were dug from their holes in deep jungle. The immature specimen of which only the skull was preserved, was found in the same hole along with one of the females and an adult male, which escaped, and the remaining pair were captured together. Both the females contained a single fairly advanced embryo, so that it is evident that the young ones remain with their parents until the young of the succeeding year are born.

A wound from a porcupine's quill is considered by the Malays as very dangerous, and we were solemnly informed that if the quill penetrated as far as the first dark ring, the injury would inevitably prove fatal.

Locally this species is known as *landak*, the brush-tailed porcupine being called *landek*.'

56. *Atherura macroura* (Linn.)

Hystrix macroura, Linn. *Syst. Nat.* 1, p. 77 (1766).

Atheroura macroura (Linn.) Flower, *P.Z.S.* 1900, p. 364.

a. ♂. Kampong Jalor, Jalor. 14th November, 1901.

57. *Nemorhoedus swettenhami*, Butler

Nemorhoedus swettenhami, Butler, *P.Z.S.* 1900, p. 675.

Nemorhoedus sumatrensis (Shaw), Flower, *P.Z.S.* 1900, p. 370 ; Bonbote, *op. cit.*, p. 882.

2 ♀ (skins only). Biserat, Jalor. 30th July, 1901.

Frontlet. Purchased in Patani Town.

Frontlet. Purchased from Hill Sakais, Temongoh, Upper Perak.

In these skins the whole animal is jet black, with the exception of the hairs along the mane, which are tawny at their tips and dirty white at their bases.

'The *kambing gurun* is, speaking relatively, quite a common animal in suitable localities throughout the Peninsula, though no more than one specimen has ever been shot by a European. Its favourite haunts are the precipitous limestone hills, thickly clad with jungle, that form a very characteristic feature in the landscape of many parts of the Peninsula, both on the East and West coasts. It is, however, by no means confined to such localities, for it was not uncommon on Bukit Besar, more especially on the precipitous South-Western face, and even at our encampment above Ban Sai Kau we heard the curious call, half-way between a bleat and a roar, of the male. By offering a liberal reward we managed to persuade some of the Biserat natives to snare us two specimens.'

58. *Cervulus muntjac* (Zimm.)

Cervus muntjac, Zimm. *Geog. Gesch.* II, p. 131 (1780).

Cervulus muntjac (Zimm.), Flower, *P.Z.S.* 1900, p. 371.

Six pairs of horns, Tanjong Luar, Jalor-Rhaman border, and the Jarum district of Rhaman (obtained from natives).

'The muntjac was evidently common on Bukit Besar, and its barking cry was often heard.'

59. *Cervus unicolor*, Bechst.

Cervus unicolor, Bechst *Allgem. Uebers d. vierfus, Thiere*, I, p. 112 (1700); Flower, *P.Z.S.* 1900, p. 372; Bonbote, *op. cit.*, p. 882.

Frontlet. Tanjong Luar, Jalor-Rhaman border.

Frontlet. Hulu Sungkei, South Perak.

'Obtained from natives. At Jahar, some distance inland from Biserat, we saw a nearly adult female of this species in the possession of the Siamese magistrate of the district.'

60. *Tragulus javanicus canescens*, Mill.

Tragulus canescens, Mill. *Proc. Biol. Soc. Wash.* XIII, p. 185 (1900).

Tragulus napu (F. Cuv.), Flower, *P.Z.S.* 1900, p. 374.

a. imp. sk. and skull. Grit, Upper Perak, April, 1902.

'This form is also common in the Batang Padang district, South Perak, and we saw two or three specimens at Gedong in the possession of natives. Speaking generally, this species is everywhere rarer than the succeeding, or possibly is not so much esteemed for food.'

61. *Tragulus kanchil affinis*, Gray

Tragulus affinis, Gray, *P.Z.S.* 1861, p. 138.

Tragulus javanicus (Gm. nec Osbeck), *Flower, P.Z.S.* 1900, p. 374; *Bonhote, op. cit.*, p. 883, and of authors generally.

Tragulus rarus, *Miller, Proc. Biol. Soc. Wash.* xv, p. 173 (1902).

a.	♀.	Mabek, Jalor.	28th July, 1901.
b.	♀.	Biserat, Jalor.	14th July, 1901.
c.	♀.	Rhaman.	14th July, 1901.
d-e.	♂, ♀.	Kampong, Jalor.	October, 1901.

In my recent paper on the genus I have shewn the reason for adopting GRAY's name for this form of *T. kanchil*. It is, however, very closely allied to *T. fulviventer*, of which the exact locality is unfortunately doubtful. They may be distinguished from *T. fulviventer* by their slightly smaller size and paler coloration. The type of *T. fulviventer* has in addition a rufous transverse stripe under the throat at the apex of the triangular marking which connects the colour at either side of the neck.

'The Malays are acquainted with four species of *Tragulus*, which they state are quite distinct, viz.: the *Napu* (*T. javanicus*); the *Pelandok*, which is the present species; the *Pelandok angin* (*wind chevrotain*),¹ which is said to be very rare and which we have not been able to identify; and the *Kanchil*, which is much smaller than any of the other species, and may be the young of *T. kanchil*.

Throughout the Malay Peninsula *Traguli* of one species or another are extremely abundant, though so shy that they can rarely be captured, except by snaring. They do not seem to frequent nor seem to care for very thick jungle, frequenting by preference the bamboo forest that is very prevalent in certain localities, such as the Batang Padang Valley, between about 1500 and 3000 feet, and the country round Mabek, where we frequently saw specimens.'

62. *Sus cristatus*, Wagner

Sus cristatus, *Wagner, Munch. gel. Anz.*, p. 535 (1839); *Flower, P.Z.S.* 1900, p. 375.

Skin of head and skull, imm. ♀. Telôm, Perak Pahang boundary. January, 1902.

'This specimen was sold to us by some Sakais who had brought it up as a pet, and whom it followed about like a dog, coming to them when they called it, but foraging for itself in the jungle.'

63. *Orcaella brevirostris* (Owen)

Phocaena brevirostris, *Owen, Trans. Z.S.* vi, p. 24, pl. 4, figs. 1-3 (1866).

Orcaella brevirostris (Owen), *Anders. P.Z.S.* 1871, p. 143.

a. ♂ skeleton, nr. Patani. October, 1901.

1. Cf. *Fascic. Malay.—Anthropology—part 1*, p. 102.

'A school of five individuals of this species were enclosed in the fishermen's seine, on the sea face of Tanjong, Patani, and we secured two specimens. Unfortunately, one was washed away by an unusually high tide. The fishermen told us that they were often seen in Patani roads, and even crossed the bar of Patani River, but we never saw them except on this occasion. The specimens were both males, and were of a grey colour, between French grey and lead, slighter paler on the ventral surface.'

The dimensions, in millemetres, were as follows :—

	A	B
Length, snout to middle point of fluke	2200	2752
Breadth of fluke	600	657
Length of flipper	385	412
Anterior margin of flipper to anus	961	998
Anus to middle point of fluke	714	703
Girth at flippers	930	866
Girth at anus	714	760
Greatest Girth	1194	1250
From middle point of fluke to posterior margin of dorsal fin	938	922
Length of dorsal fin	144	182
Height of dorsal fin	64	70

'At Pak Yun, on the Taleh Sap (great lake), about half-way between Senggora and Lampam, I saw, on May 12, a school of five or six small cetaceans, apparently not much over four feet in length, and of an almost uniform rich chocolate brown (*Platanista* sp. ?). The water was here only very slightly brackish, the taste of salt being hardly perceptible. At the end of March, 1899, the 'Skeat' Expedition saw a school of similar cetaceans at almost exactly the same place, and the natives told me that it was always in the vicinity of the village, the lake being very narrow at this point.'—N.A.

'In the estuary of the Trang River, in salt water, I had a good view of a solitary cetacean, apparently about twice the size of those at Pak Yun, and of a uniform dead white colour. Its rostrum was only moderately elongated (*Sotalia sinensis* ?).—N.A.

64. *Manis javanica*, Desm.

Manis javanica, Desm. *Mamm.* p. 377 (1822); Flower, *P.Z.S.* 1900, p. 378; Bonhote, *loc. cit.* p. 883.

- a. ♂ ad. Kampong Jalor, Jalor. 3rd November, 1901.
b, c. ♀ imm. Ban Sai Kau, Nawngchik. May, 1901.

In the two immature specimens the latter half, and in the adult the terminal third, of the tail is white.

Cattle

‘In addition to the buffalo (*Bubalus indicus*), which has become feral in parts of Legeh, and on the islands off the Trang coast, the Malays of the Patani States own two breeds of horned cattle—a small, short-horned variety of the zebu (*Bos zebu*), and a breed known in the Federated Malay States as Kelantan cattle, but called in Patani, *Lembu siam*. The latter are also small, and resemble the cattle of the Channel Islands in build and colouring, being generally dun with black points and ankles. The zebras are frequently black or red. The bulls of the latter breed are trained to fight with one another, by shoving with their heads, rarely using their horns, and large sums of money are lost and won in betting on a favourite bull. The ‘Siamese’ cattle are only used for ploughing, and for sale in the British States. The two breeds are allowed to mingle freely, and every gradation from one to the other, as far as hump, general configuration and colour, is frequently to be seen, but the hybrids show a curious tendency to develop depressed and somewhat corrugated horns like those of a buffalo.’

Elephants and Sheep

‘The captive elephants in the Patani States are allowed to wander freely in the jungle for a considerable proportion of the year, with hobbles shaped like a figure of eight on their forelegs. Some attention is paid to breeding them by the Rajas of Legeh and Jalor, and in each of these States there is an official known as Ku Chang, whose duty it is to superintend all matters of the kind. The Raja of Jalor told me that fully adult elephants breed once in five or seven years, and that the female went pregnant for from ten to twelve months,’ and also that the period of gestation was longer in the case of a bull calf. He also said that ordinary cattle bred every year, buffaloes once in three years, and sheep and goats twice in the year. He had never heard of a cow having more than one calf at a time.’—N.A.

‘At Kampong Budi, where a considerable number of sheep were pastured, we were told that they bred every seven months.’

Canis familiaris

In connexion with Mr. BONHOTE’s remarks in a former paper (*P.Z.S.* 1900, p. 874) it may be of interest to note that we examined a considerable number of pariah dogs’ skulls at Kampong Jalor, and found that the large proportion of them were asymmetrical in both jaws, there being frequently one tooth less than the normal number either on the left or right side indifferently.

1. Two years is usually believed to be the correct period.—N. A.

EXPLANATION OF PLATES

PLATE I

Sciurus robinsoni, Bonhote (p. 24)

PLATE II

FIGS. 1, 2. *Mus jalorensis*, Bonhote (p. 28)

FIG. 3. *Mus griseiventer*, Bonhote (p. 30)

PLATE III

Hystrix grotei, Gray (p. 39)

PLATE IV

FIG. 1. *Mus annandalei*, Bonhote (p. 30)

FIG. 2. *Mus bukit*, Bonhote (p. 27)

FIG. 3. *Mus rufescens*, Gray (p. 28)

FIG. 4. *Mus jalorensis*, Bonhote (p. 28)

FIG. 5. *Mus griseiventer*, Bonhote (p. 30)

FIG. 6. *Sciurus nigrovittatus*, Horsf. (p. 23)

FIG. 7. *Sciurus vittatus*, Raffles (p. 22)

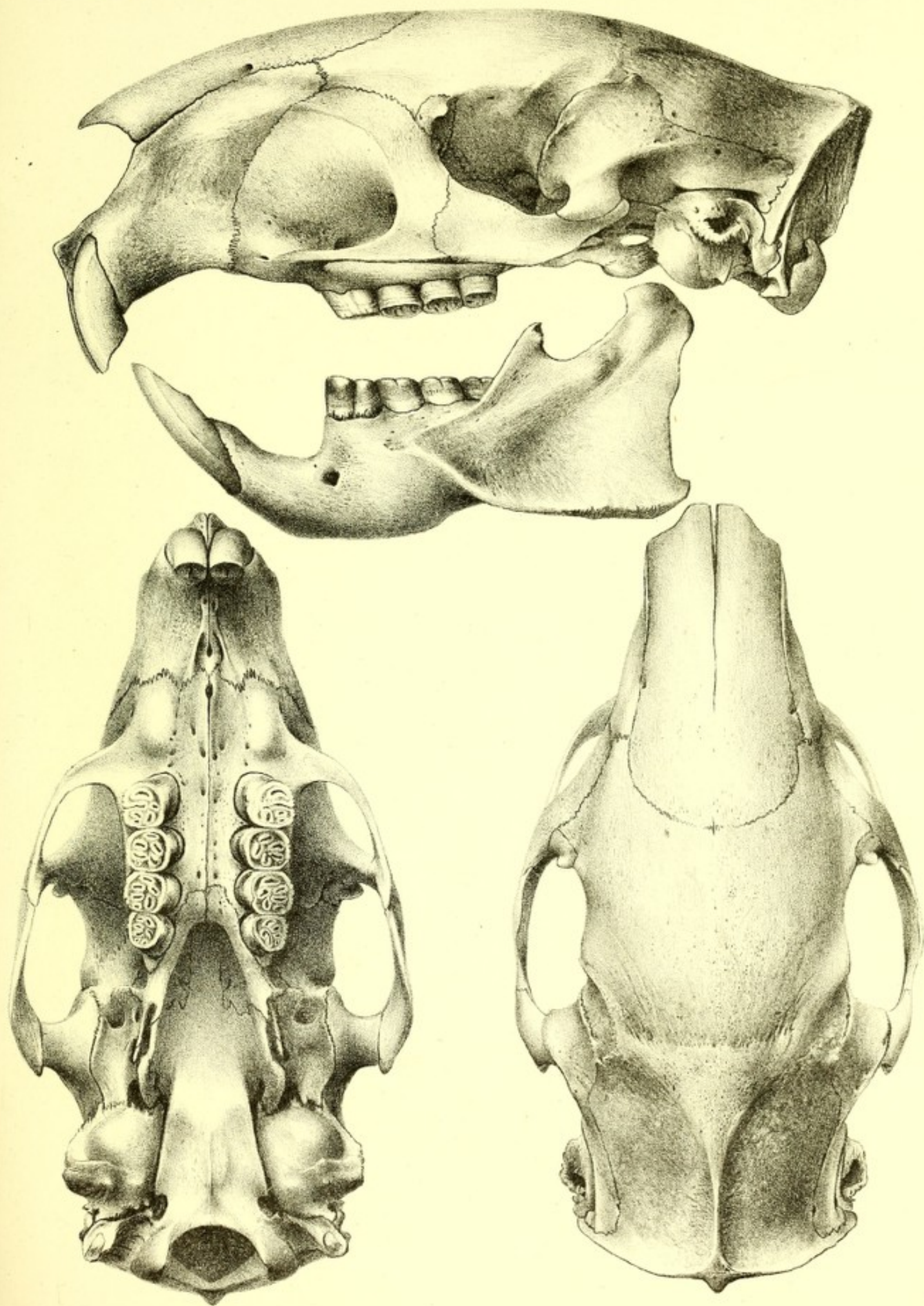








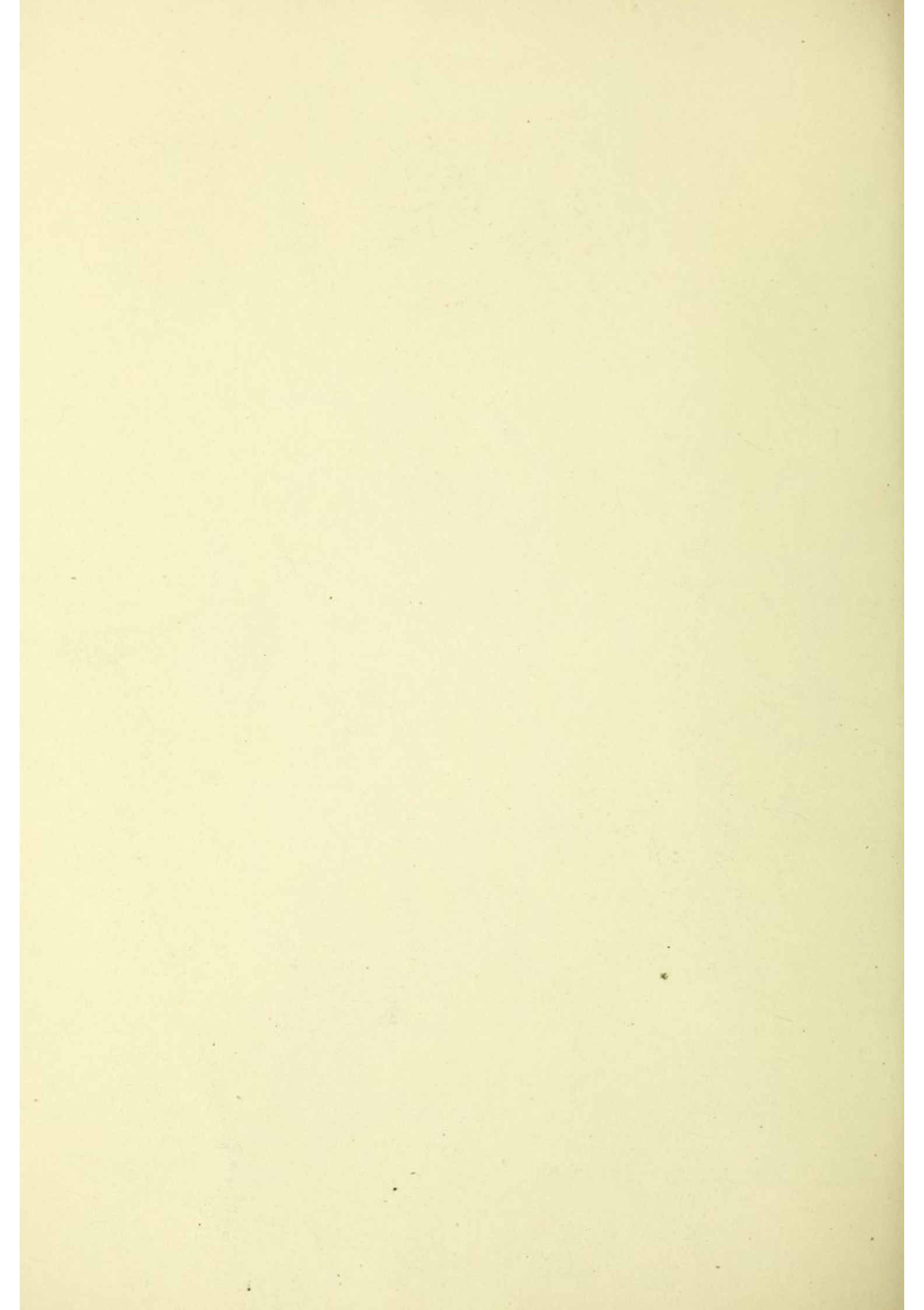


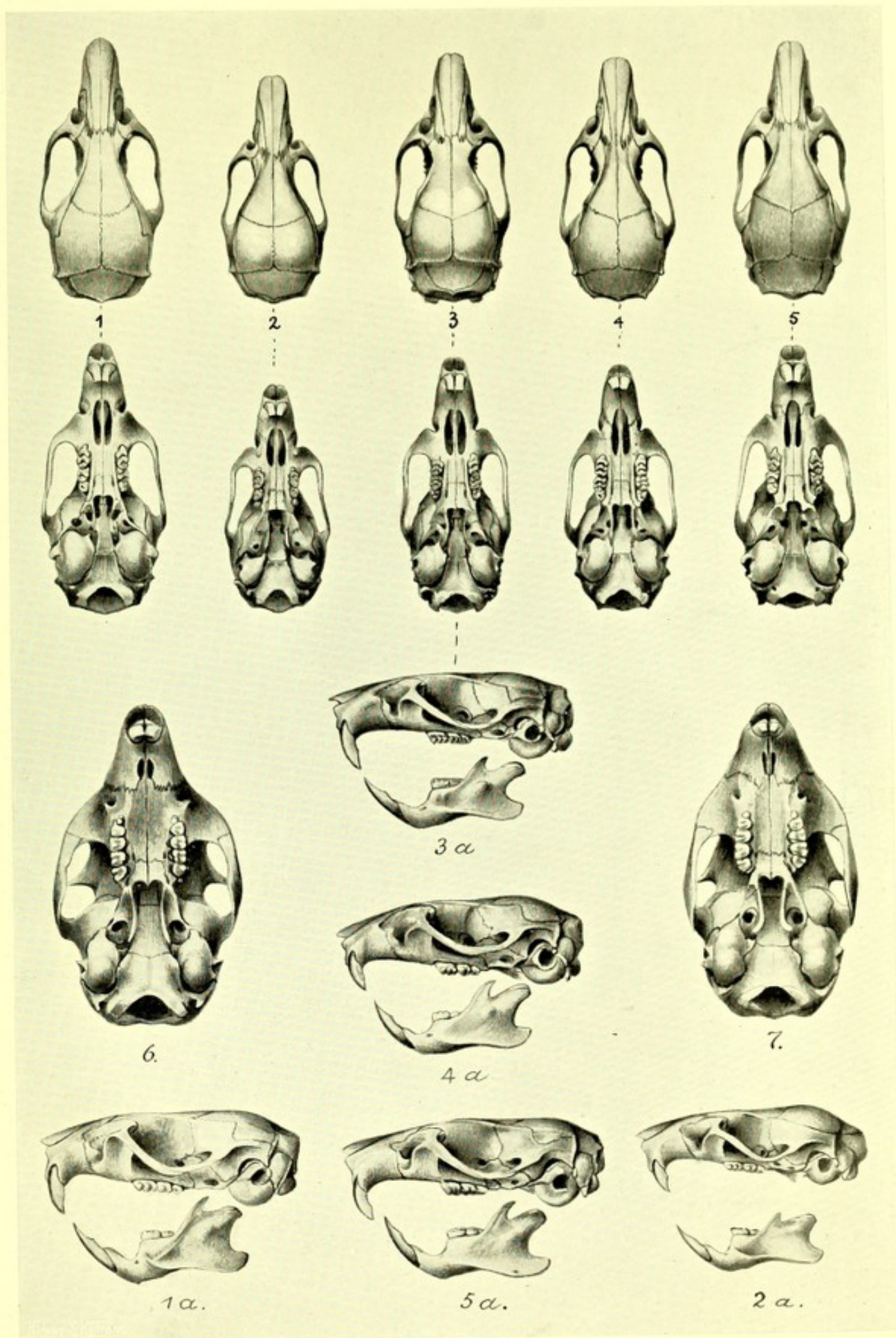


H Grönvold del. et lith.

Mutern Bros imp.

HYSTRIX GROTEI, GRAY.
(NAT SIZE).





Skulls of *Sciurus* and *Mus* from the Malay Peninsula.

