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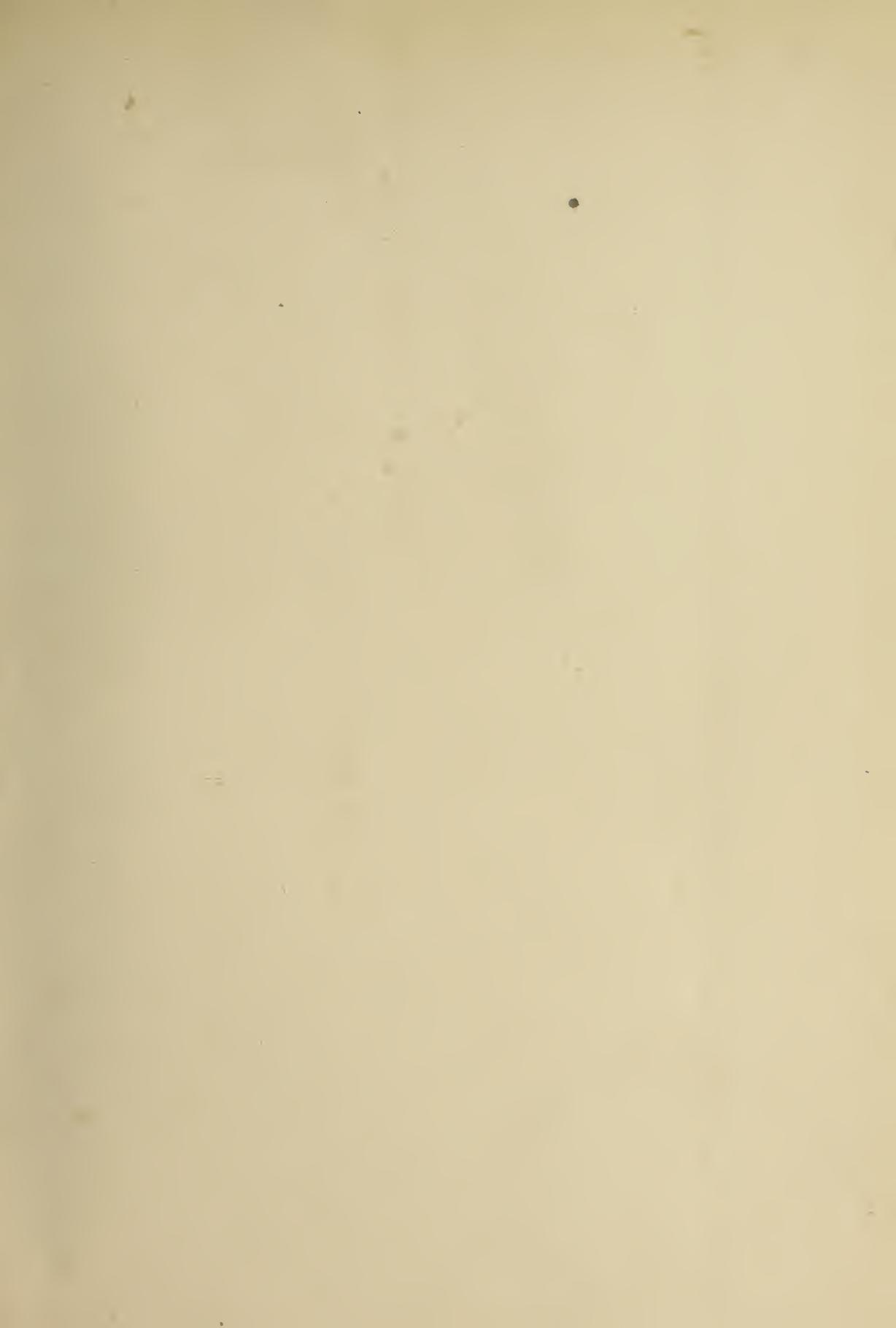
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FASCICULI  
MALAYENSES

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ZOOLOGY  
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PART I  
OCTOBER, 1903  
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FASCICULI MALAYENSES



# FASCICULI MALAYENSES

ANTHROPOLOGICAL AND ZOOLOGICAL RESULTS OF AN EXPEDITION  
TO PERAK AND THE SIAMESE MALAY STATES, 1901-1902

UNDERTAKEN BY

NELSON ANNANDALE AND HERBERT C. ROBINSON

UNDER THE AUSPICES OF THE UNIVERSITY OF EDINBURGH AND  
THE UNIVERSITY OF LIVERPOOL

## ZOOLOGY

### PART I

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MAMMALS

BY

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



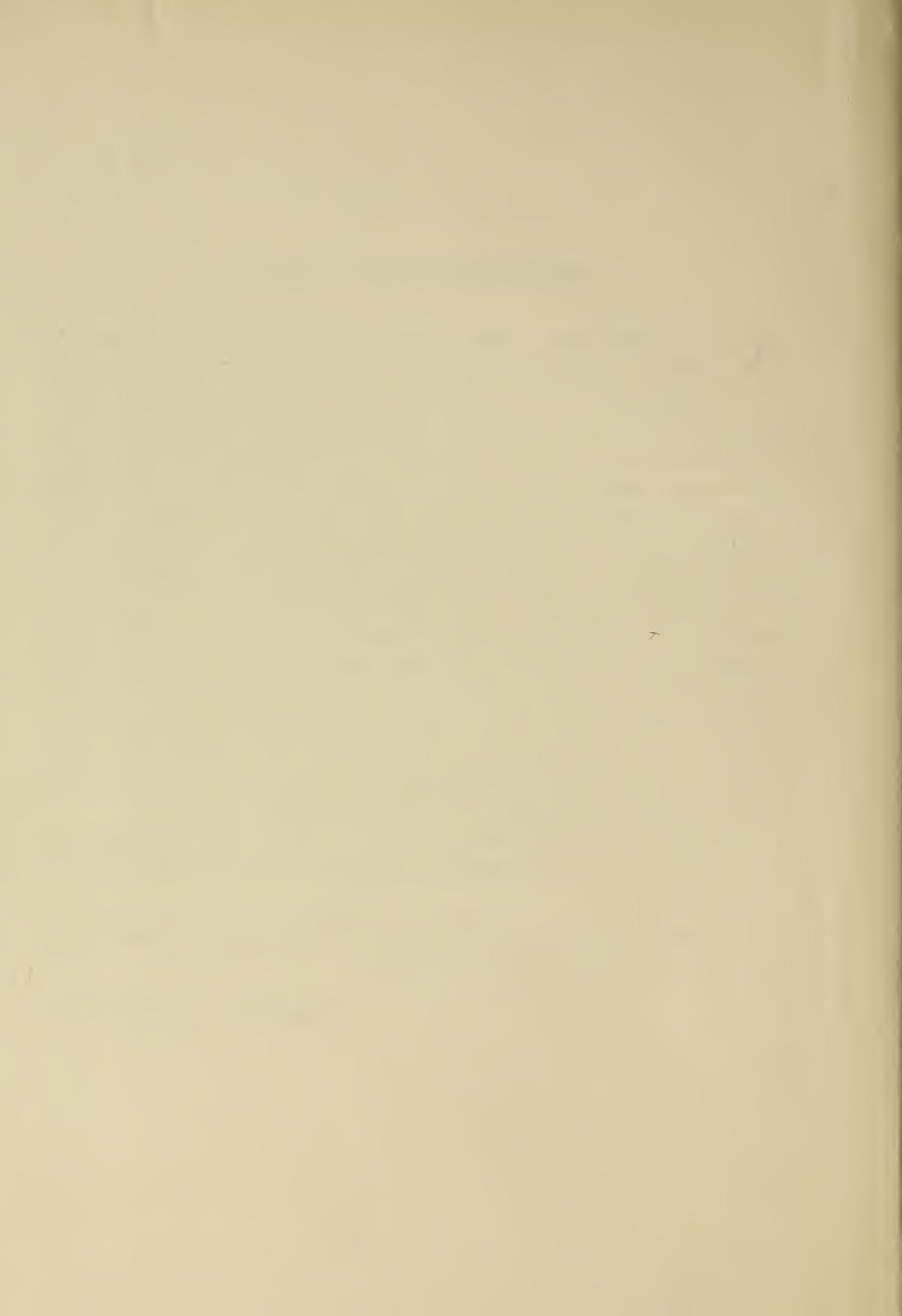
## INTRODUCTORY NOTE

**A**LTHOUGH 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.



## 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. *Nemorboedus 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 LINNÆUS' 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; Bonbote, *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 Nawnghchik.	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 obscurus**<sup>1</sup> (Reid)

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

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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, Verhandl.*, 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 MULLER should apparently stand as a synonym of *S. femoralis*, and according to the original description, MULLER'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. *Semnopitbeci* 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.* 1, p. 44 (1766).

*Nycticebus tardigradus* (LINN.), *Blanf. Faun. Brit. Ind., Mamm.*, p. 45 (1888);  
*Flower, P.Z.S.* 1900, p. 321; *Bonbote, 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, Nawangchik. 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),<sup>1</sup> 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 *srigâla* (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 *srigâla* not uncommon in the Jarum district, the larger and redder species—that which I saw—being called *srigâla 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 Nawangchik 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 *srigâla* 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.* II, p. 42 (1841).

*Tupaia belangeri* (Wagner), *Bonbote, 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.* I, p. 74 (1766).

*Crocidura murina* (Linn.), *Flower, P.Z.S.* 1900, p. 337; *Bonbote, 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-c. ♀ 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,<sup>1</sup> under the name *R. affinis rouxi*<sup>2</sup> (TEMN.) 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.* II, 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**<sup>1</sup> (Horsf.)

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

Scotophilus castaneus (Horsf.), *Bonhote, 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 topotypes<sup>1</sup> 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. Götbeeb. Vet. Svensk. Handl.* 1, 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.* 11, 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 argenteauris*, *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); Bonbote, *Ann. Mag. Nat. Hist.* (7) vii, p. 272 (1901).

*Sciurus caniceps*, Gray, *Flower, P.Z.S.* 1900, p. 356; Bonbote, *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 macclellandi leucotis* (Temm.)

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

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

*Sciurus macclellandi 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*, *Bonbote, 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; *Bonbote, loc. cit.*, p. 878.

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

*Sciurus vittatus typicus*, *Bonbote, 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 note<sup>1</sup> 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.

<i>a-c.</i>	3 ♂ (1 imm.).	Bukit Besar, Nawngchik, 2500'.	May, 1901.
<i>d, e.</i>	♂, ♀ ad.	Bukit Besar, Nawngchik, 2500'.	28th August, 1901.
<i>f.</i>	♀.	Bukit Besar, Nawngchik, 2500'.	3rd September, 1901.
<i>g.</i>	♀.	Gedong, Batang Padang, South Perak.	10th January, 1902.
<i>h.</i>	♀.	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.<sup>1</sup> 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 hensenion	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 hensenion, 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<sup>1</sup>), 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*<sup>1</sup>. 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.’

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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*, *Pyctoris*, 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 *Pyctoris*<sup>1</sup>

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 *pyctoris* 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**

- |   |                              |
|---|------------------------------|
| 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 pella, <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 caudator, <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**

- |  |                         |
|--|-------------------------|
| 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**

- |  |                 |
|--|-----------------|
| Mus rajah, <i>Thos. Ann. Mag. Nat. Hist.</i> (6) xiv, p. 451 (1894). | Borneo.         |
| Mus hellwaldi, <i>Fentink, 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*

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

**Subgroup Cremoriventer**

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

**WHITEHEADI GROUP**

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

**BOWERSI GROUP**

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

**XANTHURUS GROUP**

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

**MUELLERI GROUP**

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

**INFRALUTEUS GROUP**

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

## RATTUS GROUP

## Subgroup Rufescens

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

## Subgroup Pyctoris

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

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

## Subgroup Griseiventer

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

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

- Mus decumanoides*, Hodgs. *J. A.S.B.* x, p. 915 (1841).  
*Mus ceylonus*, Kelaart *Prodromus*, (1850).  
*Mus infralineatus*, Elliot ; Blyth, *J. A.S.B.* xxxii, p. 348 (1863).

## CHRYSOCOMUS GROUP

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

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

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

<i>a, b.</i>	♀.	Kampong Jalor, Jalor.	4th November, 1901.
<i>c.</i>	♀.	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. erythrogegens*, 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 MARSDEN<sup>1</sup>; 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; Bonhote, *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 ravus*, *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*),<sup>1</sup> 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 millimetres, 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 zebus 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,<sup>1</sup> 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. ВОННОТЕ’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 Goodchild del et lith

SCIURUS ROBINSONI.

Mintern Bros imp





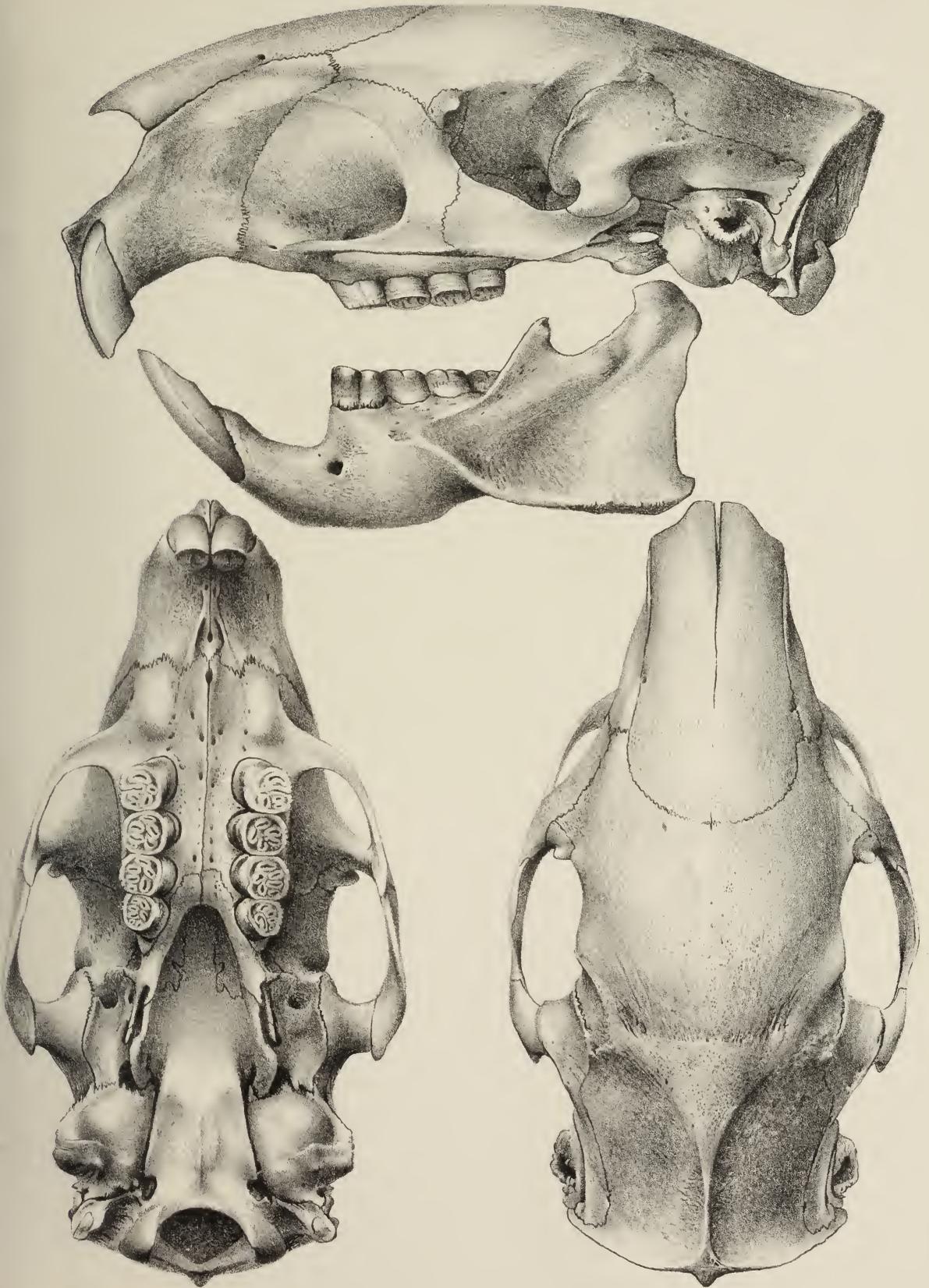
H Goodchild del et lith.

MinternBros imp.

1. 2. MUS JALORENSIS.  
3. MUS GRISEIVENTER.

*2/3 nat size*



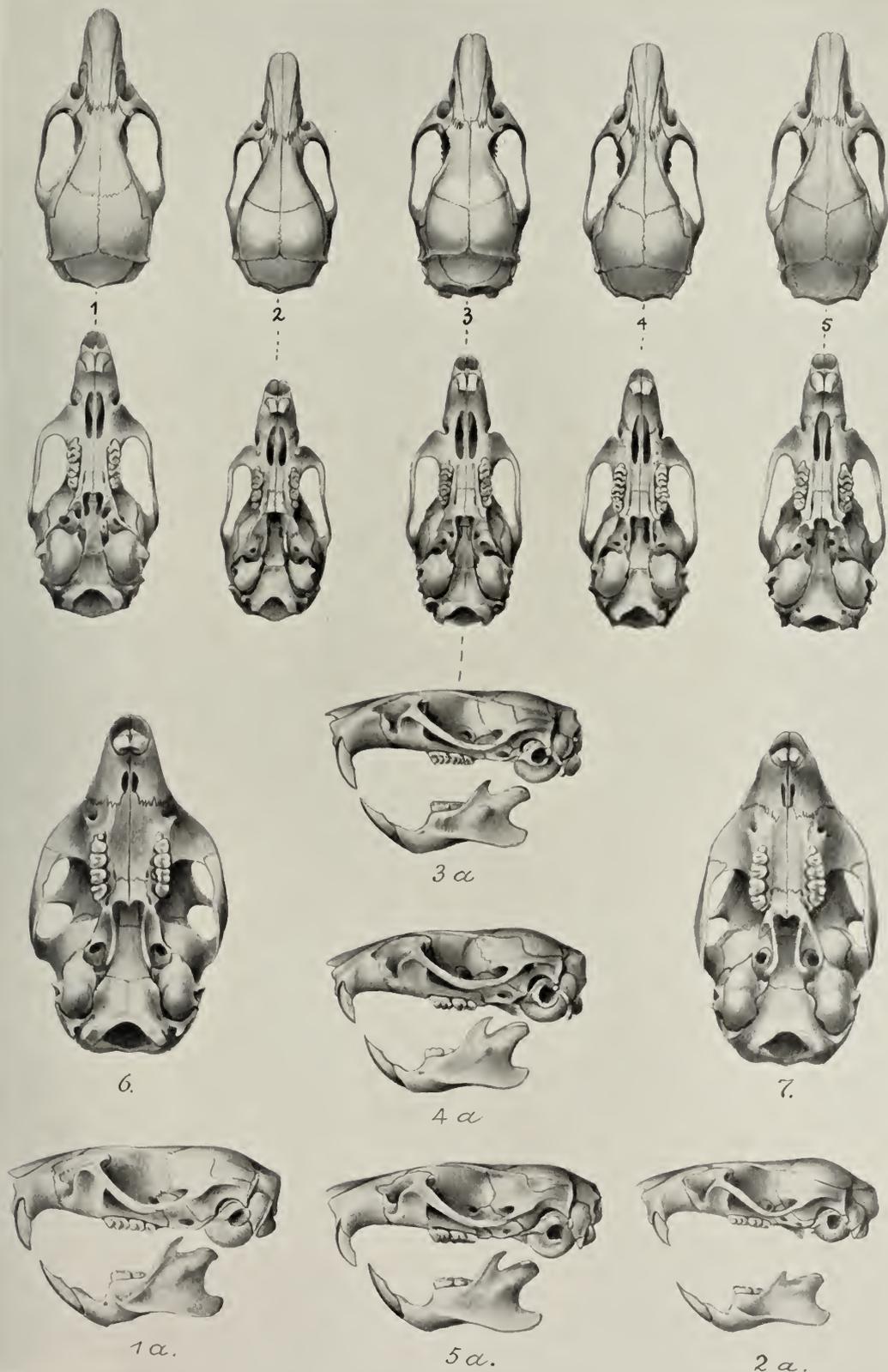


H. Grönvold del. et lith.

HYSTRIX GROTEI, GRAY.  
(NAT. SIZE).

Mintern Bros. imp.





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



LEPIDOPTERA HETEROCERA

BY

COL. CHARLES SWINHOE, M.A., F.E.S.



## INTRODUCTORY NOTE

THE notes I have added to Colonel SWINHOE's paper are derived from the observations of Mr. ROBINSON and myself in the Patani States and Perak, Mr. ROBINSON being solely responsible for those specimens collected in Selangor.<sup>1</sup>

Our collections must not be regarded as in any way exhaustive; it rather illustrates the variety of the Heterocera in the districts visited, seeing that the two hundred and sixty-nine species enumerated are, in very many cases, each represented by a single specimen or by two, while not unfrequently a genus, or even a family, is included on the same basis, indeed, there are two hundred genera noted and barely six hundred specimens. The specimens were collected casually, as they came, and with scarcely any process of selection. This consideration I have thought it well to put forward prominently, as it is of importance in the study of certain biological phenomena.

It will be readily seen that a very large proportion of the collection was made round our lamp at night; and that most of the specimens so secured were taken on a comparatively small number of evenings. These evenings were usually showery, with bright (often moon-lit) intervals, with sudden gusts of wind and calm periods, but we could never be sure that many moths would be attracted on such a night, and on several occasions large numbers were attracted under wholly different atmospheric conditions. It is probable that shelter from the weather was often as important a source of attraction as the light, and that many of the moths were actually impelled to us by the wind.

The series of the different species obtained are far too small to permit wide generalizations as to the distribution of the Heterocera in the Malay Peninsula, but one thing they seem to indicate—that there is no such absolute separation in this group between the fauna of jungle country in the plains and that of the high mountains, as there is, say, in the case of the birds.

NELSON ANNANDALE

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1. The Selangor specimens were, with very few exceptions, collected during a few moonlight nights in May, in a bungalow at the summit of the Semangho Pass (2,700 feet), on the borders of Selangor and Pahang. H.C.R.



## REPORT ON THE HETEROCERA

BY COLONEL C. SWINHOE, M.A., F.E.S.

## SPHINGIDAE

**Chaerocampa**, *Dup. Hist. Nat. Lep. Fr. Sys.*, p. 159, pl. 2 (1835).1. **Chaerocampa lineosa***Chaerocampa lineosa*, *Walker*, viii, 144 (1856); *Butler*, *Ill. Het. Brit. Mus.* V, p. 9, pl. 79, fig. 7 (1881).

♂. Telôm, Perak-Pahang boundary. 4,000 feet. 22nd January, 1902.

♂. Telôm, Perak-Pahang boundary. 4,000 feet. 23rd January, 1902.

‘We found this moth common at Telôm in January. On moonlight nights it flitted rapidly over the surface of the stream, especially over some stones standing in the water on which our men were in the habit of cleaning poultry. A considerable number of specimens of both sexes were always seen together, but they did not appear to be attracted by the light of our candles, and we never found them more than a few yards distant from the river.’

## SATURNIIDAE

**Attacus**, *Hübner, Verz. Schmett.*, p. 155 (1818).2. **Attacus atlas***Phalaena atlas*, *Linn. Mus. Lud. Ulr.*, p. 366 (1764).

1 ♂. Biserat, Jalor. July, 1901.

9 ♀. Biserat, Jalor. 27th July—1st August, 1901.

‘Very common round Biserat in July and August; larvae feeding on a variety of shrubs and small trees. Also seen in South Perak in early spring.’

**Actias**, *Leach, Zool. Misc.* ii, p. 25 (1815).*Tropaea*, *Hübner, Verz. Schmett.*, p. 152 (1818).*Plectropteron*, *Hutton, Ann. Nat. Hist.* xvii, p. 60 (1846).

**3. Actias selene**

*Actias selene*, *Hübner, Samml. Exot. Schmett.* i, p. 172 (1806).

*Phalaena (Attacus) luna*, *Cram. (nec Drury), Pap. Exot.* i, pl. 31, fig. B (1775).

*Plectropteron diana*, *Hutton, loc. cit.*

1 ♀. Ban Sai Kau, Nawngchik. (Nat. Coll.; only specimen seen).

A very large female measuring  $7\frac{7}{10}$  inches in expanse of wings, and nearly  $6\frac{1}{2}$  inches from the base of the costa of fore wings to the tips of the tail: it has no indication of the usual discal transverse line on the wings, and has a narrow dark-pink outer marginal band on both wings, continued on to the tail for nearly two-thirds of its length.

**BOMBYCIDAE**

**Prismosticta**, *Butler, Ann. Mag. Nat. Hist.* (5) vi, p. 67 (1880).

**4. Prismosticta tiretta, nov.**

♂, ♀. Of a uniform ochreous brown, with a red tinge, especially towards the anal angle of the hind wings; fore wings with a brown lunule at the end of the cell, an antemedial outwardly-curved brown line, a central line from the lunule hindwards; these are obsolete in the female; both wings with two discal transverse lines, which are closer together at the abdominal margin of the hind wings, where they bend round inwards; a white hyaline lunular mark a little below apex of fore wings; under side pale and more ochreous, a brown lunule at end of each cell, hyaline spot with outer double discal lines as above. Expanse of wings:—♂,  $1\frac{6}{10}$ ; ♀,  $1\frac{9}{10}$  inches.

There are three males from Sandakan, unnamed, in the British Museum.

♂, ♀ in copulâ. Gedong, South Perak. 9th January, 1902.

'I found these specimens resting on a leaf of a low-growing shrub in dense jungle, mistaking them at first sight for a couple of dead leaves. They sat with their wings spread out at right angles to the abdomen, but, especially in the male, the posterior border of the hind wings was curled upwards and inwards, so as to greatly increase the insects' resemblance to dead leaves.'

**EUPTEROTIDAE**

**Pseudojana**, *Hampson, Moths India* i, p. 48 (1892).

**5. Pseudojana incandescens**

*Jana incandescens*, *Walker*, iv, 910 (1855).

*Pseudojana incandescens*, *Hampson, loc. cit.* (fig. 31).

1 ♀. Grit, Upper Perak. (At light).

## NOTODONTIDAE

**Besida**, *Walker*, xxxii, 456 (1865).

6. **Besida xylinata**

*Besida xylinata*, *Walker*, xxxii, 456.

1 ♂. Biserat, Jalor. 17th July, 1901. (At light).

## SYNTOMIDAE

**Euchromia**, *Hübner, Verz. Schmett.*, p. 121 (1818).

7. **Euchromia orientalis**

*Euchromia orientalis*, *Butler, Journ. Linn. Soc. London*, xii, p. 364 (1876).

1 ♀. Patani. 9th October, 1901.

1 ♀. Biserat, Jalor. 14th October, 1901.

‘Both specimens were taken in low secondary jungle, resting among foliage in the daytime.’

**Eressa**, *Walker*, i, 149 (1854).

8. **Eressa cirifinis**

*Eressa cirifinis*, *Walker*, i, 149.

1 ♂. Biserat. 3rd July, 1901.

‘From spider’s web on cliff in jungle. Though dead and dry, it was untouched by the spider.’

9. **Eressa discinota**

*Syntomis discinota*, *Moore, Lep. Atk.*, p. 13 (1879).

*Eressa discinota*, *Hampson, Pbal.* i, p. 123 (fig.) (1898).

2 ♂. Mabek, Jalor. 27th July, 1901.

♂, ♀ (*in coitu*). Biserat, Jalor. 5th November, 1901.

1 ♀. Biserat, Jalor. 19th October, 1901.

HAMPSON says, with seven orange bands on abdomen of male, six in the female ; this should be reversed.

10. **Eressa annosa**

*Syntomis annosa*, *Walker, Journ. Linn. Soc. London*, iii, p. 183 (1859).

*Eressa annosa*, *Hampson, Pbal.* i, p. 120 (1898).

♂, ♀ (*in coitu*). Kampong Mabek, Jalor. 26th July, 1901.

'The members of this genus are generally found resting at no great distance from the ground, in fairly open country. Being of brilliant or conspicuous coloration, they make little, if any, attempt to conceal themselves, though they often take shelter from the mid-day heat under leaves or amidst foliage. They are very sluggish, and do not take to flight readily.'

**Trichaeta**, *Swinhoe*, *Cat. Het. Mus. Oxon.* i, p. 52 (1892).

**11. Trichaeta albiplaga**

*Syntomis albiplaga*, *Walker, Journ. Linn. Soc. London*, vi, p. 92 (1862).

1 ♂. Gedong, South Perak. 8th January, 1902.

**Syntomis**, *Ochs.*, *Eur. Schmett.* ii, p. 103 (1808).

**12. Syntomis euryptera**

*Syntomis euryptera*, *Hampson, Phal.* i, p. 87, pl. 3, fig. 10 (1898).

1 ♂. Bukit Besar, Nawngchik, 2,500 feet. 21st May, 1901.

1 ♂. Bukit Besar, Nawngchik, 2,500 feet. 25th August, 1901.

**13. Syntomis divisa**

*Syntomis divisa*, *Walker*, i, 131 (1854).

♂, ♀ (*In coitu*). Patani. 18th April, 1901.

**14. Syntomis sperbius**

*Zygaena sperbius*, *Fabr.*, *Mant. Ins.* ii, p. 103 (1787).

*Syntomis sperbius*, *Hampson, Phal.*, i, p. 106 (1898)

♂, ♀ (*In coitu*). Patani. 18th April, 1902

1 ♂. Biserat, Jalor. 16th July, 1902.

1 ♀. Biserat, Jalor. 13th July, 1902.

1 ♀. Mabek, Jalor. 22nd July, 1901.

'Common on shrubs at the edge of paths and in low undergrowth.'

**Ceryx**, *Wallgrn.*, *Wien. Ent. Mon.* vii, p. 140 (1863).

**15. Ceryx transitiva**

*Syntomis transitiva*, *Walker, Journ. Linn. Soc. London*, vi, p. 89 (1862).

*Ceryx transitiva*, *Hampson, Phal.* i, p. 45 (1898).

1 ♂. Telôm, Perak-Pahang boundary. 4,000 ft. 25th January, 1902.

‘What has been said of *Eressa* is equally true of the representatives in the Malay Peninsula of the succeeding genera. Their coloration, often black, yellow and hyaline, combined with their form and the relative proportions of their bodies and wings, gives them a quite general resemblance to wasps.’

### CHALCOSIIDAE

**Pidorus**, *Walker*, ii, 424 (1854).

Laurion, *Walker*, ii, 427.

#### 16. *Pidorus geminus*

Laurion gemina, *Walker*, ii, 427.

*Milleria bifasciata*, *Walker*, *Journ. Linn. Soc. London*, vi, p. 99 (1862).

4 ♀. Biserat, Jalor. 3rd to 8th July, 1901.

‘Common in July round Biserat. Rests during the day, sometimes in conspicuous positions, among the low undergrowth at the edge of secondary jungle. When disturbed, it either falls to the ground and lies still, or takes a rapid and jerky flight, which does not carry it very far from its original station. When at rest, its wings are folded in such a way that the posterior pair are completely concealed.’

**Trypanophora**, *Kollar*, *Hugel's Kaschmir*, iv, p. 457 (1844).

#### 17. *Trypanophora festinata*

*Trypanophora festinata*, *Snellen*, *Deutsche Ent. Zeit. Lep.* viii, p. 131 (1895).

1 ♀. Bukit Besar, Nawngchik. 2,500 ft. 17th May, 1902.

**Chalcosia**, *Hübner*, *Verz. Schmett.*, p. 173 (1818).

#### 18. *Chalcosia coliadoides*

*Chalcosia coliadoides*, *Walker*, *Journ. Linn. Soc. London*, vi, p. 87 (1862).

1 ♀. Biserat, Jalor. 3rd July, 1901.

‘Flying in secondary jungle; afternoon. Perhaps bears a generalized resemblance to certain *Pierinae*.’

**Milleria**, *Herr.-Schäff. Lep. Exot. Sp. Nov.* i, p. 4 (1853).

#### 19. *Milleria panthona*

*Phalaena panthona*, *Cram.*, *Pap. Exot.* iv, pl. 322, fig. C (1780).

1 ♀. Patani. 9th October, 1901.

‘On under surface of leaf.’

**Cyclosia**, *Hübner, Verz. Schmett.*, p. 177 (1818).

*Pintia*, *Walker*, ii, 280 (1854).

### 20. *Cyclosia papilionaris*

*Phalaena papilionaris*, ♀, *Drury, Ins. Exot.* ii, p. 4, pl. 2, fig. 4 (1773).

*Phalaena venaria*, ♀, *Fabr., Ent. Syst.* iii, 2, 156, 99 (1794).

*Eterusia ferrea*, *Walker*, ii, 431. ♂.

1 ♀. Biserat, Jalor.	16th July, 1901.
1 ♀. Biserat, Jalor.	6th July, 1901.
1 ♀. Bukit Besar, Nawngchik (base of mountain).	29th May, 1901.

(These forms have been reared from the eggs of one female by Mr. BELL in India).

‘This species is not uncommon in Jalor and Nawngchik, flying in the brightest sunshine about village plantations and at the edge of secondary jungle. Its flight closely resembles that of several species of *Danais*, and it evidently belongs to an association of Lepidoptera, which includes several butterflies of the sub-families *Danainae*, *Pierinae*, and *Papilioninae*, and which is characterized by the possession of broad wings of white or very pale dull green, grey or yellow, heavily veined with black, dark brown, or dark blue. We have taken certain of these butterflies in the same locality and habitat, and at the same time of day as *Cyclosia papilionaris*, but it should be noted that the individual variation in size of the species makes some specimens of the moth resemble the *Rhopalocera* more nearly than others.’

**Gynautocera**, *Guérin, Mag. Zool.*, 1831, *Ins.*, pl. 12.

### 21. *Gynautocera zara*

*Gynautocera zara*, *Swinboe, Trans. Ent. Soc. London*, 1891, p. 476.

1 ♂. Biserat, Jalor. 9th August, 1901.

‘Resting on tree-trunk; afternoon. When pinned and set this insect bears a striking resemblance to the butterflies of the *Nox* group of the genus *Papilio*, especially to *P. erebus*, which it approaches most nearly in size; the resemblance being due to the shape of the wings (though they are somewhat longer and narrower in the moth than in the butterfly), to their black colour, slightly relieved by a veined blotch of bluish white in the centre of the hind wings (though the obscure veining on the forewings is characteristic of the moth and not of *P. erebus*), and to the brilliant red coloration of the sides of the body and parts of the head (though its distribution is not quite the same in

the butterfly as in the moth). If this is a case of true mimicry, or even of adaptive resemblance, and not one of coincidence, it can only be efficacious when the insects are on the wing, as the attitude of rest of the moth is different from that of any butterfly, its forewings being folded over its hind wings and held tightly pressed against the surface on which it is resting. *Papilio erebus* is a rare insect, which we did not collect, or, so far as I am aware, even see.'

**Pompelon**, *Walker*, ii, p. 413 (1854).

### 22. **Pompelon rotundata**

Pompelon rotundata, *Swinhoe*, *Cat. Het. Mus. Oxon.* i, p. 72 (1892).

1 ♀. Bukit Besar (?).

'Flying in clearing ; early morning.'

### 23. **Pompelon valentula**

Pompelon valentula, *Swinhoe*, *P.Z.S.* 1889, p. 401.

1 ♂. Biserat, Jalor. 21st October, 1901.

'Sitting on tree-trunk, mid-day. The resemblance between the two preceding species and butterflies of the genus *Euploea* is very striking, both as regards the form of their wings and their dark, blue-shot coloration, which fades into pale brown in places ; but the resemblance is probably generic rather than specific, and does not appear to be accompanied by any similarity of habits or resting attitude.'

**Amesia**, *Westw.*, *Arcana Ent.*, p. 20 (1841) ; *Nat. Library Ent.* vii, p. 93 (1841).

### 24. **Amesia namouna**

Gynautocera namouna, *Double.*, *Ann. Nat. Hist.* xix, p. 74 (1847).

Amesia namouna, *Swinhoe*, *Cat. Het. Mus. Oxon.* i, p. 78 (1892).

1 ♂. Bukit Besar, Nawngchik. 2,500 feet. 3rd September, 1901.

'I took this specimen resting under a gingerwort leaf in the jungle. It made no attempt to escape, but when I touched it, a frothy, pale-yellow liquid gushed forth in great abundance, with a distinct hissing sound, from a minute pore on each side of the thorax, so that the moth, whose wings were partially expanded, was surrounded in a few seconds with this substance, which had a faint pungent odour. The bulk of the froth very soon exceeded that

of the insect, which continued to emit it for some minutes, with redoubled vigour when touched. *Amesia namouna*, also, has something of a resemblance to the genus *Euploea*, but its habits would seem to differ from those of the butterflies, though it is very possible that the substance secreted by it may have a physiological relationship to the well-known noxious juice of this family of Rhopalocera.'

### COSSIDAE

**Duomitus**, *Butler, Ann. Mag. Nat. Hist.* (5) vi, p. 68 (1880).

#### 25. *Duomitus mineus*

*Phalaena-Bombyx mineus*, *Cram., Pap. Exot.* ii, pl. 131, fig. D (1777).

1 ♂. Bukit Besar, Nawngchik. 1,000 feet. 27th April, 1901.

'Several other very much injured specimens were brought us by natives at Sai Kau. The specimen preserved was taken resting under the leaf of a tree, which grew just at the edge of primaeval jungle. The head of the moth was bent down below the level of the thorax, the antennae were quite concealed beneath the fore wings, which were folded and arched so as to make the dorsal surface rounded, and the first pair of legs were held stretched out in such a way as to resemble those of a beetle. I mistook the specimen, which made no attempt to escape, for some large Buprestid, and was surprised to find it soft to the touch. We did not capture any species of beetle to which this moth could be said to bear a definite resemblance; but Buprestids with a similar type of coloration (forepart of the body dark metallic green, wings or elytra, flame-colour or deep orange, boldly spotted with the same metallic shade) occur in the Malay Peninsula, and Mr. RICHARD EVANS, of the Skeat Expedition, found on Bukit Besar a Longicorn—not yet described, but probably belonging to a new genus—which presents very much the same general appearance, though in shape it does not resemble the moth so closely as certain of the Buprestidae would do.'

**Phragmataecia**, *Newman, Zoologist* viii, p. 2931 (1850).

#### 26. *Phragmataecia castaneae*

*Bombyx castaneae*, *Hübner, Beitr.* iii, p. 9, pl. 1, fig. C (1790).

*Phragmataecia castaneae*, *Hampson, Moths India* i, p. 313, (fig. 213) (1892).

1 ♂. Sungkei, South Perak. 9th February, 1902. (At light).

## DREPANULIDAE

**Problepsidis**, *Hampson, Moths India* iv, p. 476 (1896).

27. **Problepsidis ostia**, nov.

♂. White, frons brown, antennae grey, rather broadly pectinated, shafts white; fore wings with a thin subcostal blackish band, running on to the costa near apex, with a white spot in it on the costa near the apex; internal, medial, and discal blackish lines from the hinder margin, all meeting near the apex, the space above the medial line smeared in parts with pale black, a small patch of this colour in the middle of the disc outside the outer line, also on the outer margin intermixed with a festoon of white; hind wings also with inner, medial, and discal lines, the first two corresponding to the last two on the fore wings, a smear of black outside both lines; the outer margin and cilia of both wings blackish; on the under side there is a black thick band across both wings and some black suffusion on the fore wings. Expanse of wings:— $1\frac{2}{10}$  inches.

1 ♂. Telöm, Perak-Pahang boundary. 4,000 ft. 24th January, 1902.

‘Resting on leaf, with wings spread out flat and antennae concealed beneath them. Distantly resembled a bird’s dropping.’

## LIMACODIDAE

**Parasa**, *Moore, Cat. Lep. E.I.C.*, p. 413 (1859).

28. **Parasa lepida**

*Phalaena noctua lepida*, *Cram., Pap. Exot.* ii, pl. 130, fig. E (1777).

1 ♂. Patani. 10th October, 1901.

1 ♀. Patani. 8th October, 1901.

‘Both specimens at light.’

29. **Parasa dharmā**

*Parasa dharmā*, *Moore, Cat. Lep., E.I.C.* ii, p. 414, pl. 11a, fig. 7 (1859).

1 ♂. Bidor, South Perak. 12th January, 1902. (At light).

**Susica**, *Walker*, v, 1114 (1855).

30. **Susica pallida**

*Susica pallida*, *Walker*, v, 1114.

*Susica pallida*, *Hampson, Moths India* i, p. 377, (fig. 257) (1892).

Selangor.

**Miresa**, *Walker*, v, 1123 (1855).

**31. Miresa albipuncta**

*Nyssia albipuncta*, *Herr.-Schäff.*, *Lep. Exot.* i, fig. 179 (1853).

*Miresa albipuncta*, *Swinhoe*, *Cat. Het. Mus. Oxon.* i, p. 232 (1892).

Selangor.

**Narosa**, *Walker*, v, 1151 (1855).

**32. Narosa doenia**

*Parasa doenia*, *Moore*, *Cat. Lep. E.I.C.* ii, p. 416, pl. 11a, fig. 10 (1859).

1 ♂. Jeram Kawan, South Perak. 15th January, 1902. (At light).

**Altha**, *Walker*, *Journ. Linn. Soc. London*, vi, p. 173 (1862).

**33. Altha adala**

*Narosa adala*, *Moore*, *Cat. Lep. E.I.C.* ii, p. 418, pl. 11a, fig. 14 (1859).

1 ♂. Mabek, Jalor. 27th October, 1901.

**Natada**, *Walker*, v, 1108 (1855).

**34. Natada pallivitta**

*Miresa pallivitta*, *Moore*, *Ann. Mag. Nat. Hist.* (4) xx, p. 93 (1877).

*Miresa pallivitta*, *Kirby*, *Cat. Het.* i, p. 549 (1892).

1 ♂. Sungkei, South Perak. 8th February, 1902.

1 ♂. Sungkei, South Perak. 6th February, 1902.

‘Both specimens at light.’

**Thosea**, *Walker*, v, 1068 (1855).

**35. Thosea rara**

*Thosea rara*, *Swinhoe*, *P.Z.S.*, p. 408, pl. 43, fig. 9 (1889).

1 ♂. Biserat, Jalor. 18th October, 1901. (At light).

**LYMANTRIIDAE**

**Orgyia**, *Ochs.*, *Schmett. Eur.* iii, p. 298 (1810).

**36. *Orgyia turbata***

*Orgyia turbata*, *Butler, Trans. Linn. Soc. London* (2) i, p. 560 (1879).

4 ♂. Biserat, Jalor. 1st July, 1901—13th July, 1901.

‘All at light.’

***Pantana***, *Walker*, iv, 819 (1855).

**37. *Pantana visum***

*Liparis visum*, *Hübner, Zutr.* iii, p. 33 (1825).

*Pantana dispar*, *Walker*, iv, 820 (1855).

1 ♂. Biserat, Jalor. 7th July, 1901.

1 ♂. Biserat, Jalor. 23rd October, 1901.

‘One specimen flew into the house at mid-day, and settled on the wall with its wings raised and their dorsal surfaces applied to one another; the other was taken on the wing in the open at mid-day.’

***Leucoma***, *Steph. Ill. Brit. Ent. Haust.* ii, p. 64 (1829).

**38. *Leucoma marginalis***

*Redoa marginalis*, *Walker, Journ. Linn. Soc. London*, vi, p. 128 (1862).

*Leucoma marginalis*, *Swinhoe, Cat. Het. Mus. Oxon.* i, p. 202 (1892).

1 ♂. Biserat, Jalor. 1st July, 1901. (At light).

1 ♀. Bukit Besar, Nawngchik. 2,600 feet. 20th April, 1901.

‘Resting on upper surface of leaf in jungle; morning.’

**39. *Leucoma transiens***

*Redoa transiens*, *Walker, Journ. Linn. Soc. London*, vi, p. 129 (1862).

*Leucoma transiens*, *Swinhoe, Cat. Het. Mus. Oxon.* i, p. 203 (1892).

Selangor.

***Laelia***, *Steph., Ill. Brit. Ent. Haust.* ii, p. 62 (1829).

**40. *Laelia prolata***

*Laelia prolata*, *Swinhoe, Cat. Het. Mus. Oxon.* i, p. 195 (1892).

1 ♀. Biserat, Jalor. 21st October, 1901.

‘Resting on branch of herbaceous plant growing in the open; early morning.’

**Cobanilla**, *Moore, Lep. Ceylon* ii, p. 120 (1883).

**41. Cobanilla plumbacea**, nov.

♂. Of a uniform plumbaceous grey colour, speckled with very fine silver scales; fore wings with a black spot at end of cell, blackish costal line, a blackish spot on costa before apex, being the commencement of an irregular blackish, indistinct, discal band, represented on the hind wings by a blackish patch near the anal angle; some blackish suffusion on the outer margin of the wings below apex and on hind wings below the middle; under side ochreous grey, with some blackish suffusion inside the fore wings. Expanse of wings,  $1\frac{3}{10}$  inches.

One example. Bukit Besar, Nawngchik, 2,500 feet. 5th May, 1901.

The shape of the wings is similar to *Cobanilla marginata*, MOORE, the type of the genus.

**Numenes**, *Walker*, iii, 662 (1855).

*Pseudomesa*, *Walker*, iv, 923 (1855).

**42. Numenes siletti**

*Numenes siletti*, *Walker*, iii, 663 (1855).

*Pseudomesa quadriplagiata*, *Walker*, iv, p. 923 (1855).

1 ♀. Biserat, Jalor. 8th July, 1901.

‘Resting among low undergrowth at base of cliff.’

This example has on the costa the commencement of a subapical transverse band.

**Euproctis**, *Hübner, Verz. Schmett.*, p. 159 (1818).

**43. Euproctis flavinata**

*Artaxa flavinata*, *Walker*, xxxii, 331 (1865).

2 ♂. Biserat, Jalor.

17th October, 1901.

2 ♂. Biserat, Jalor.

8th July, 1901.

1 ♀. Telôm, Perak-Pahang boundary. 4,000 feet. 17th January, 1902.

‘The males are not uncommon round Biserat, resting in conspicuous positions during the daytime; the female was taken hovering over long grass at dusk, very much as the male of *Hepialus humuli* does in this country.’

**44. Euproctis transversa**

*Artaxa transversa*, Moore, *Cat. Lep. E.I.C.*, p. 352, pl. 9a, fig. 8 (1859).

*Euproctis guttistriga*, Walker, *Journ. Linn. Soc. London*, vi, p. 129 (1862).

- 2 ♀. Bukit Besar, Nawngchik. 2,500 feet. 24th August, 1901.  
 1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 7th May, 1901.  
 1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 2nd September, 1901.

‘Mr. ROBINSON took two specimens resting on tree-trunks in jungle, and notes that they were very sluggish. I took another on the wing at dusk in similar environment.’

**45. Euproctis munda**

*Euproctis munda*, Walker, *Journ. Linn. Soc. London*, vi, p. 129 (1862).

- 1 ♀. Bidor, South Perak. February 2nd, 1902. (At light).

**Lymantria**, Hübner, *Verz. Schmett.*, p. 160, (1818).

**46. Lymantria beatrix**

*Bombyx beatrix*, Stoll, *Cram., Suppl. Pap. Exot.* v, p. 173, pl. 40, fig. 2 (1790).

- 1 ♀. Biserat, Jalor. 5th August, 1901. (At light).

**Dasychira**, Steph. *Ill. Brit. Ent. Haust.* ii, p. 58 (1829).

**47. Dasychira horsfieldii**

*Arctia horsfieldii*, Saunders, *Trans. Ent. Soc.* i, p. 162, pl. 12, fig. 1, 2 (1851).

*Dasychira horsfieldii*, Swinhoe, *Cat. Het. Mus. Oxon.* i, p. 220 (1892).

1. Telôm, Perak-Pahang boundary. 4,000 feet. 26th January, 1902.

‘Found dead in jungle.’

**AGANAIDAE**

**Peridrome**, Walker, ii, 444 (1854).

**48. Peridrome orbicularis**

*Hypsa (Peridrome) orbicularis*, Walker, ii, 444 (1854).

- 2 ♂. Bukit Besar, Nawngchik. 2,500 feet. 1st and 2nd September, 1901.  
 5 ♀. Bukit Besar, Nawngchik. 2,500 feet. 28th August and 3rd September, 1901.  
 1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 31st August, 1901.

The last female is curiously marked on the hind wings, the discal spots being joined together by a thin black band, which is acutely elbowed above the middle, and joins the black spot at the upper end of the cell.

'We did not take this species on our first visit to Bukit Besar, in April and May, but it was very common in the jungle round our clearing (2,500 feet) in August and September. Lower down the mountain it became scarcer, and we did not see it much below a thousand feet. It would appear to be essentially a jungle species, and its absence from, or comparative rarity on, the lower slopes may not be entirely due to inferior altitude, but also to the fact that large clearings have at one time existed on them.

*Peridrome orbicularis* rests during the day below the large leaves of the gingerworts and other plants of similar growth, whence it issues forth towards dusk; the readiness with which it is disturbed and its strength on the wing causing it falsely to appear to be a diurnal species.'

**Anagnia**, *Walker*, ii, 446 (1854).

**49. Anagnia subfascia**

Hypsa (*Peridrome*) *subfascia*, *Walker*, ii, 446.

- |      |                         |             |  |
|------|-------------------------|-------------|--|
| 2 ♂. | Bukit Besar, Nawngchik. | 2,500 feet. | 3rd September, 1901, and August, 1901. |
| 3 ♀. | Bukit Besar, Nawngchik. | 2,500 feet. | 24th August, 1901-30th August, 1901.   |
| 1 ♀. | Bukit Besar, Nawngchik. | 3,000 feet. | 27th August, 1901.                     |

'On Bukit Besar this species closely resembles *Peridrome orbicularis* in habits and distribution, as it does in appearance. One male was taken on the wing in bright moonlight, at the edge of our little clearing.'

**Euplocia**, *Hübner*, *Verz. Schmett.*, p. 172 (1818)

**50. Euplocia membliaria**

*Phalaena membliaria*, *Cram., Pap. Exot.* iii, pl. 269, fig. C, D (1780).

- |      |  |                      |
|------|--|----------------------|
| 1 ♂. | Tanjang Luar, borders of Jalor and Rhaman. | 13th October, 1901.  |
| 1 ♂. | Between Anak Bukit and Sai Kau, Nawngchik. | 26th May, 1901.      |
| 1 ♂. | Bukit Besar, Nawngchik. 2,500 feet.        | 2nd September, 1901. |
| 1 ♀. | Between Anak Bukit and Sai Kau, Jalor.     | 26th May, 1901.      |
| 1 ♀. | Tanjang Luar, borders of Jalor and Rhaman. | 13th October, 1901.  |
| 1 ♀. | Bukit Besar, Nawngchik. 1,000-2,000 feet.  | 23rd August, 1901.   |

'All these specimens were taken in thick jungle, and the species apparently resembles *Anagnia subfascia* and *Peridrome orbicularis* in habits.'

**Neochera**, *Hübner*, *Verz. Schmett.*, p. 173 (1818).

**51. Neochera butleri**

*Neochera butleri*, *Swinhoe*, *Cat. Het. Mus. Oxon.* i, p. 84 (1892).

*Neochera marmorea*, *Butler*, ♀ only (*nec Walker*), *Ill. Het. B.M.* v, p. 43, pl. 87, fig. 11 (1881).

4 ♂. Biserat, Jalor.	3rd and 9th July, 1901.
4 ♂. Bukit Besar, Nawngchik. 1,000, 2,000, and 2,500 feet.	28th August, 1901.
4 ♂. Bukit Besar, Nawngchik. 1,000, 2,000, and 2,500 feet.	7th September, 1901.
2 ♂. Ban Sai Kau, Nawngchik.	14th September, 1901.
3 ♀. Biserat, Jalor.	9th and 15th July, 1901.
1 ♀. Bukit Besar, Nawngchik. 2,500 feet.	30th August, 1901.
2 ♀. Ban Sai Kau, Nawngchik.	9th July, 1901, and 16th September, 1901.
1 ♀. Gedong, South Perak.	7th January, 1902.

'This species is exceedingly common, especially in the summer months, in the plains of the Patani States. On Bukit Besar it occurs as high as 2,500 feet, but is not common above 1,000 feet. It becomes scarcer in the thickly wooded central region of the Peninsula, and is comparatively rare in Perak. Like the preceding members of its family, it conceals itself during the day beneath leaves, but the foliage it selects belongs to the low trees that constitute recent secondary jungle. Its flight is strong, and it is very easily disturbed.'

### 52. *Neochera bhawana*

*Neochera bhawana*, *Moore*, *Cat. Lep. E.I.C.* ii, p. 295, pl. 7a, fig. 4, ♂. (1859).

1 ♂, 1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 7th September, 1901.

*Asota*, *Hübner*, *Verz. Schmett.*, p. 164 (1818).

*Hypsa*, *Hübner*, *loc. cit.* p. 172.

### 53. *Asota caricae*

*Noctua caricae*, *Fabr.*, *Syst. Ent.* p. 596, 23 (1775).

*Phalaena Attacus alciphron*, *Cram.*, *Pap. Exot.* ii, p. 58, pl. 133, fig. E (1777).

1 ♂. Jambu, Jhering.	6th June, 1901.
1 ♂. Biserat, Jalor.	29th June, 1901.
1 ♂. Biserat, Jalor.	14th July, 1901.
1 ♀. Sungkei, South Perak.	6th January, 1902.

'Two specimens were taken resting under leaves in the jungle during the day, and two, a male and a female, flew into the house at night, though they did not seem to be attracted by our light. I noticed, in one instance, that the geckos, which were hunting other moths on the ceiling, appeared to avoid this species. The flight is feeble.'

**54. Asota egens**

Hypsa egens, *Walker*, ii, 453 (1854).

*Asota egens indica*, *Rothsch.*, *Nov. Zool.* iv, p. 321 (1897).

1 ♀. Biserat, Jalor. 14th July, 1901.

This is Rothschild's *indica* form with six black spots on the under side of the hind wings.

'Mr. ROBINSON took the specimen among shrubs on the roadside, at dusk; I disturbed another during the day among the undergrowth at the base of a limestone cliff.'

**55. Asota anawa, nov.**

♂, ♀. The male is like *A. strigivenata*, BUTLER, above, but the wings are much shorter; below, the white basal portion of the fore wings is more limited, the brown apical third being clearly defined with an acute excavation in its centre. The female is like *A. caricae*, FABR., but all the veins of the fore wings are white and are clearly defined; the hind wings have the commencement of the marginal band at the apex, and three black spots, one at the apex of the cell and two in the disc; below, the fore wings are white for two-thirds from the base, the apical third brown with a sinuous inner margin, but clearly defined, the hind wings as above, but with the apical band not so macular. Expanse of wings:— $2\frac{4}{10}$  inches.

1 ♂. Bukit Besar, Nawngchik. 2,500 feet. 29th August, 1901.

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. ?

1 ♀. Biserat, Jalor. 16th July, 1901.

'The male was taken on the wing in bright moonlight, at the edge of the clearing, but in deep jungle. One female was resting on dead leaves on the jungle floor during the day, and was very inconspicuous.'

**Deilemera**, *Hübner*, *Verz. Schmett.*, p. 178, (1818).

**56. Deilemera tripunctaria**

*Phalaena tripunctaria*, *Linn. Syst. Nat.* x, p. 523 (1758).

*Phalaena petulca*, *Sparm.*, *Amoen. Acad.* xii, p. 500 (1769).

*Nyctemera atralba*, *Hübner*, *Verz. Schmett.*, p. 178 (1818).

*Nyctemera sumatrensis*, *Heylaerts*, *Compt. Rend. Soc. Ent. Belg.* xxxiv, p. 17 (1890).

1 ♀. Biserat, Jalor. 15th July, 1901.

2 ♂. Jarum, Rhaman. 22nd April, 1902.

1 ♀. Telôm, Perak-Pahang boundary. 4,000 feet. 27th January, 1902.

'Common on wing in jungle; day-time.'

**57. Deilemera harca**

*Leptosoma harca*, *Swinboe, Ann. Mag. Nat. Hist.* (6) xii, p. 215 (1893).

1 ♀. Jambu, Jhering. 6th June, 1901.

‘Flying among shrubs ; morning. Flight swift and sustained.’

**58. Deilemera coleta**

*Phalaena coleta*, *Cram., Pap. Exot.* iv, pl. 368, fig. H (1781).

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 12th May, 1901.

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 4th May, 1901.

1 ♀. Gedong, South Perak. 7th January, 1902.

‘Not uncommon in small clearings surrounded by jungle. Flies chiefly in the evening, concealing itself among long grass in the heat of the day.’

**ARCTIIDAE**

**Maenas**, *Hübner, Verz. Schmett.*, p. 167 (1818).

**59. Maenas maculifascia**

*Spilosoma maculifascia*, *Walker*, iii, 676 (1855).

*Alpenus maculifascia*, *Semper, Schmett. Philipp.* ii, pl. 56, figs. 9, 10 (1899).

1 ♂. Sungkei, South Perak. 6th February, 1902. (At light).

**Diacrisia**, *Hübner, Verz. Schmett.*, p. 169 (1818).

**60. Diacrisia strigatula**

*Diacrisia strigatula*, *Walker*, iii, 613 (1855).

1 ♀. Biserat, Jalor. 29th June, 1901.

‘Laid 165 pale-green, almost spherical eggs in pill box. They were somewhat flattened at the base.’

**61. Diacrisia brunnea**

*Arctia brunnea*, *Heylaerts, C.R. Soc. Ent. Belg.* xxiv, p. xxix (1890).

*Diacrisia brunnea*, *Hampson, Phal.* iii, p. 304, pl. 45, fig. 18, ♂ (1901).

1 ♀. Bidor, South Perak. 4th February, 1902.

I think I am correct in my identification, but HEYLAERTS' type is a unique male, and this example is a female ; the dorsal band is macular and not a stripe as in the male, but otherwise the description and the figure both correspond.

**Cretonotos**, *Hübner, Verz. Schmett.*, p. 169 (1818).

**62. Cretonotos transiens**

*Spilosoma transiens*, *Walker*, iii, 675 (1855).

*Amphissa vacillans*, *Walker*, iii, 685.

*Aloa isabellina*, *Walker*, iii, 705.

- 3 ♂. Biserat, Jalor. 1st July, 1901.  
 1 ♂. Biserat, Jalor. 7th July, 1901.  
 1 ♀. Biserat, Jalor. 30th July, 1901.

‘All at light.’

**Utetheisa**, *Hübner, Verz. Schmett.*, p. 168 (1818).

*Deiopeia*, *Steph., Ill. Brit. Ent. Haust.* ii, p. 92 (1829).

**63. Utetheisa pulchella**

*Tinea pulchella*, *Linn., Syst. Nat.* i, p. 534 (1758).

- 2 ♂, 2 ♀. Biserat, Jalor. 10th and 16th July, 1901.

‘One female at light in house; two males and a female flying among sensitive plants (*Mimosa* sp.) at dusk.’

**LITHOSIIDAE**

**Ilema**, *Hübner, Verz. Schmett.*, p. 165 (1818).

**64. Ilema vicaria**

*Lithosia vicaria*, *Walker*, ii, 505 (1854).

*Lithosia antica*, *Walker*, ii, 505.

*Lithosia natara*, *Moore, Cat. Lep. E.I.C.*, p. 304 (1859).

*Lithosia sarawaka*, *Butler, Trans. Ent. Soc. London*, 1877, p. 350.

*Lithosia imitans*, *Mab., Bull. Soc. Zool. Fr.* iii, p. 87 (1878).

- 1 ♂. Biserat Jalor. 10th July, 1901. (At light).

**65. Ilema tortricoides**

*Lithosia tortricoides*, *Walker, Journ. Linn. Soc. London*, vi, p. 107 (1862).

*Lithosia tortricoides*, *Hampson, Ill. Het. B.M.* viii, p. 4, pl. 143, fig. 16 (1891).

*Teulisna biplagella*, *Butler, Trans. Ent. Soc. London*, 1877, p. 355.

- 1 ♂. Mabek, Jalor. 26th July, 1901.

‘Sitting on leaf, with wings folded.’

**66. *Ilema plagiata***

*Teulisna plagiata*, *Walker, Journ. Linn. Soc. London*, vi, p. 109 (1862).

*Teulisna plagiata*, *Swinboe, Cat. Het. Mus. Oxon.* i, p. 120, pl. 3, fig. 11 (1892).

1 ♂. Telôm, Perak-Pahang boundary. 4,000 feet. 22nd January, 1902.

‘Resting with wings folded, on leaf in jungle ; afternoon.’

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 30th April, 1901.

‘Resting on jungle floor ; daytime.’

The ♂ has the central square black patch on fore wings reduced to a band.

**67. *Ilema torta***

*Corcura torta*, *Walker, Journ. Linn. Soc. London*, vi, p. 111 (1862).

*Corcura torta*, *Swinboe, Cat. Het. Mus. Oxon.* i, p. 119, pl. 3, fig. 10 (1892).

1 ♂. Mabek, Jalor. 23rd July, 1901.

‘Mr. ROBINSON’S note :—“Sitting on leaf of low shrub in jungle, with its front and hind legs almost at right angles to the body, and its antennae close to its wings.”’

***Chionaema***, *Herr.-Schäff., Ausser. Schmett.*, p. 20 (1859).

**68. *Chionaema effracta***

*Barsine effracta*, *Walker*, ii, 546 (1854).

*Chionaema effracta*, *Hampson, Phal.* ii, p. 300 (fig.) (1900).

Selangor.

**69. *Chionaema selangorica***

*Chionaema selangorica*, *Hampson, Ann. Mag. Nat. Hist.* (7) xi, p. 346 (1903).

Selangor.

***Asura***, *Walker*, ii, 484 (1854).

**70. *Asura congerens***

*Cymella congerens*, *Felder, Reise Nov.*, pl. 106, fig. 14 (1874).

*Asura congerens*, *Hampson, Phal.* ii, p. 454 (1900).

1 ♀. Biserat, Jalor. 16th October, 1901. (At light).

**Barsine**, *Walker*, ii, 546 (1854).

**71. Barsine lineata**

*Ammatho lineatus*, *Walker*, iii, 760 (1855).

*Miltochrista lineata*, *Hampson*, *Phal.* ii, p. 482 (1900).

Selangor.

**Lambula**, *Walker*, xxxv, 1890 (1868).

**72. Lambula pallida**

*Lambula pallida*, *Hampson*, *Phal.* ii, p. 100, pl. 20, fig. 18 (1900).

1 ♀. Biserat, Jalor. 17th July, 1901. (At light).

**Eugoa**, *Walker*, xii, 768 (1857).

**73. Eugoa bipuncta**

*Paidia bipuncta*, *Heylaerts*, *C.R. Soc. Ent. Belg.* xxxv, p. cccciv (1891).

*Eugoa bipuncta*, *Hampson*, *Phal.* ii, p. 547, pl. 34, fig. 6 (1900).

1 ♀. Biserat, Jalor. 7th July, 1901. (At light).

**AGARISTIDAE**

**Eusemia**, *Dalm.*, *Mon. Castniae*, p. 26 (1825).

**74. Eusemia fasciatrix**

*Eusemia fasciatrix*, *Westw.*, *Cab. Or. Ent.*, p. 67 (1848).

*Eusemia bijugata*, *Walker*, *Journ. Linn. Soc. London*, vi, p. 85 (1862).

*Eusemia communicans*, *Walker*, xxxi, 50 (1864).

*Eusemia darocana*, *Druce*, *Ann. Mag. Nat. Hist.* (6) xiv, p. 23 (1894).

1 ♂. Bukit Besar, Nawngchik. 2,500 feet. 2nd September, 1901. 'Nat. coll.'

**NOCTUINA**

**TRIFIDAE**

**Ancara**, *Walker*, xv, 1714 (1858).

**75. Ancara obliterans**

*Ancara obliterans*, *Walker*, xv, 1715.

1 ♀. Sungkei, South Perak. 10th January, 1902. (At light).

**Zalissa**, *Walker*, xxxiii, 936 (1865).

**76. Zalissa transiens**

*Eusemia transiens*, *Walker*, vii, 1588 (1856).

Selangor.

**Spodoptera**, *Guenée*, *Noct.* i, p. 153 (1852).

**77. Spodoptera mauritia**

*Hadena mauritia*, *Boisd., Faun. Madag. Lep.*, p. 92 (1834).

*Spodoptera nubes*, *Guenée, loc. cit.*, p. 155, 246.

1 ♂. Biserat, Jalor. 7th July, 1901. (At light).

1 ♀. Biserat, Jalor. 3rd July, 1901. „

**Ilattia**, *Walker*, xvi, p. 208, (1859).

**78. Ilattia leucospila**

*Perigea leucospila*, *Walker*, xxxii, 643 (1865).

1 ♂. Biserat, Jalor. 29th June, 1901. (At light).

**Diethusa**, *Walker*, xvi, 205 (1858).

**79. Diethusa consentana**

*Eutelia consentana*, *Walker, Journ. Linn. Soc. London*, vii, p. 68 (1864).

*Plusia detegens*, *Walker, loc. cit.*, p. 72.

*Diethusa emiliusalis*, *Swinhoe (part), Cat. Het. Mus. Oxon.* ii, p. 38 (1900).

1 ♂. Sungkei, South Perak. 11th February, 1902. (At light).

I made this species a synonym of *emiliusalis* in the *O.M. Cat.* for want of material, but, having received since many examples of both sexes from Borneo and Perak, I find there are two distinct species: *emiliusalis* = *ventralis*, and *consentana* = *detegens*.

**Caradrina**, *Ochs., Eur. Schmett.* iv, p. 80 (1816).

**80. Caradrina exigua**

*Noctua exigua*, *Hübner, Samml. Eur. Schmett. Noct.*, fig. 362 (1810).

1 ♂. Biserat, Jalor. 19th October, 1901. (At light).

**81. Caradrina transversa**

*Tyracona transversa*, *Moore, Lep. Atk.*, p. 95, pl. 4, fig. 5 (1882).

*Caradrina transversa*, *Hampson, Moths India* ii, p. 262 (1894).

Bidor, South Perak. 22nd February, 1902.

‘Resting on tree-trunk; mid-day.’

**Leucania**, *Ochs., Eur. Schmett.* iv, p. 81 (1816).

**82. Leucania decisissima**

*Leucania decisissima*, *Walker*, xxxii, 624 (1865).

1 ♂. Biserat, Jalor. 15th July, 1901.

‘Resting on under surface of leaf in clearing, with abdomen and greater part of wings protruding from shelter, so that the metallic lustre on the ventral surface of the latter was conspicuously displayed.’

**83. Leucania consimilis**

*Leucania consimilis*, *Moore, P.Z.S.* 1881, p. 336, pl. 57, fig. 10.

1 ♀. Biserat, Jalor. 1st July, 1901. (At light).

**ACONTIIDAE**

**Erastroides**, *Hampson, Ill. Het. B.M.* ix, p. 98 (1893).

**84. Erastroides curvifascia**

*Ozarba* (?) *curvifascia*, *Hampson, loc. cit.*, viii, p. 76, pl. 145, fig. 23 (1891).

1 ♂. Biserat, Jalor. 30th June, 1901.

**Xanthoptera**, *Guenée, Noct.* ii, p. 240 (1852).

**85. Xanthoptera quintana**

*Acontia quintana*, *Swinhoe, P.Z.S.* 1885, p. 455, pl. 27, fig. 13.

1 ♂. Biserat, Jalor, 12th July, 1901. (At light).

**Acontia**, *Ochs., Eur. Schmett.* iv, p. 91 (1816).

**86. Acontia intersepta**

*Xanthodes intersepta*, *Guenée, Noct.* ii, p. 212 (1852).

1 ♀. Biserat, Jalor. 29th June, 1901.

‘Mr. ROBINSON’s note—‘Flying among bushes, late on a sunny afternoon, in open country.’

**Cerynea**, *Walker*, xix, 878 (1859).

**87. Cerynea divisa**

*Selenis divisa*, *Walker*, *Trans. Ent. Soc. London* (3) i, p. 107 (1862).

*Cerynea divisa*, *Swinhoe*, *Cat. Het. Mus. Oxon.* ii, p. 69 (1900).

1 ♀. Jambu, Jhering. 6th June, 1901.

‘Lying flat on leaf, with wings spread out, and their inner margin covering the abdomen.’

**PALINDIDAE**

**Nertobriga**, *Walker*, *Journ. Linn. Soc. London*, vii, p. 75 (1864).

*Doranaga*, *Moore*, *Lep. Ceylon* iii, p. 553 (1884).

**88. Nertobriga signata**

*Ariolica* (?) *signata*, *Walker*, *loc. cit.*, p. 54.

*Nertobriga signata*, *Swinhoe*, *Cat. Het. Mus. Oxon.* ii, p. 74 (1900).

1 ♀. Biserat, Jalor. 2nd July, 1901.

‘On wall of house ; late afternoon.’

**Maetamene**, *Hampson*, *MS. ined.*

**89. Maetamene atrigutta**

*Lyclene atrigutta*, *Walker*, *Journ. Linn. Soc. London*, vi, p. 116 (1862).

Selangor.

**SARROTHRIPIDAE**

**Gadirtha**, *Walker*, xiii, 1102 (1857).

**90. Gadirtha inexacta**

*Gadirtha inexacta*, *Walker*, xiii, 1102.

1 ♂. Biserat, Jalor. 15th July, 1901.

1 ♀. Biserat, Jalor. 22nd October, 1901.

‘Both at light.’

**Aquis**, *Walker*, xv, 1652 (1858).

**91. Aquis viridisquama**

*Aquis viridisquama*, *Walker*, xv, 1652.

*Aquis viridisquama*, *Swinhoe*, *Cat. Het. Mus. Oxon.* ii, p. 82 (1900).

Selangor.

**Hyblaea**, *Fabr., Ent. Syst.* iii (2), p. 127 (1794).

**92. Hyblaea firmamentum**

*Hyblaea firmamentum*, *Guen., Noct.* ii, p. 392, 1253 (1852).

1 ♂. Biserat, Jalor. 19th October, 1901.

‘On flowering shrub, with many other insects.’

1 ♂. Biserat, Jalor. 20th October, 1901.

The first has no spots on the hind wings above, but I have a similar example from Assam.

‘This moth is common in the day-time on the banks of the stream that separates Jalor from Rhaman, at Tanjang Luar. Here it rests on the gravel, the small pools in which are also visited by enormous numbers of butterflies. When the wings are folded it closely resembles a small, damp pebble, owing to the peculiar way in which the fore wings are arched when at rest, and to their shining, brown surface; but, when approached, it betrays itself by suddenly flying for a short distance in a very circuitous and jerky manner.’

**EUTELIIDAE**

**Anuga**, *Guen., Noct.* ii, p. 307 (1852).

**93. Anuga constricta**

*Anuga constricta*, *Guen., loc. cit.*, p. 308, 1116.

1 ♂. Bidor, South Perak. 19th February, 1902. (At light).

1 ♀. Sungkei, South Perak. 6th January, 1902. (At light).

**Targalla**, *Walker*, xiii, 1007 (1857).

**94. Targalla delatrix**

*Penicillaria delatrix*, *Guen., Noct.* ii, p. 304, 1112 (1852).

1 ♂. Bidor, South Perak. 10th February, 1902. (At light).

**STICTOPTERIDAE**

**Gyrtona**, *Walker*, xxvii, 89 (1863).

**95. Gyrtona conglobalis**

*Gyrtona conglobalis*, *Walker*, xxvii, 92 (1863).

Selangor.

**96. *Gyrtona hylusalis***

*Gyrtona hylusalis*, *Walker*, xxvii, 93 (1863).

*Gyrtona hylusalis*, *Hampson*, *Moths India* ii, p. 405 (1894).

Selangor.

**Stictoptera**, *Guen.*, *Noct.* iii, p. 51 (1852).

**97. *Stictoptera huma*, nov.**

♀. Palpi ochreous, last joint brown; head, thorax, and abdomen dark brown, thorax with pale pink markings; ground colour of fore wings pinkish white; some pale points on costa, a brown spot on costa near base, a brown, straight, and somewhat diffused band at one third; the outer third of the wing dark brown, with three lunular whitish lines on it, with dark brown outer edges; hind wings white, with a costal dark brown border, and a very broad border on the outer margin, veins also dark brown. Expanse of wings,  $\frac{8}{10}$  inch.

Biserat, Jalor. 10th July, 1901. (At light).

**GONOPTERIDAE**

**Cosmophila**, *Boisd.*, *Faun. Ent. Madag.*, p. 94 (1833).

**98. *Cosmophila xanthindyma***

*Cosmophila xanthindyma*, *Boisd.*, *loc. cit.*, pl. 13, fig. 7.

1 ♂. Biserat, Jalor. 4th July, 1901. (At light).

**Carea**, *Walker*, x, 474 (1856).

**99. *Carea robinsoni*, nov.**

♀. Palpi above, head, thorax, and fore wings dark bright pink red; palpi beneath and some spots behind the head white; fore wings with a white mark, composed of two or three dots at the end of the cell, three transverse bands formed by three clusters of white specks, and with a thick and prominent band of these specks near the outer margin; cilia with white spots, and towards hinder angle with white tips; hind wings white, the principal veins pink, and a pink patch at the apex; the colour runs down the outer margin and inwards on some of the veins; a pink interline in the white cilia; abdomen pink above, with white segmental lines, white tip, sides, and underside. Expanse of wings,  $1\frac{3}{10}$  inches.

Semangko Pass, Selangor-Pahang boundary. 2,700 feet. May, 1902.

## QUADRIFIDAE

**Patula**, *Guen., Noct. iii*, p. 176 (1852).

100. **Patula macrops**

*Phalaena-attacus macrops*, *Linn., Syst. Nat. (12) iii*, p. 225 (1769).

1 ♂. Bukit Besar, Nawngchik. 2,500 feet. 31st August, 1901.

1 ♀. Mabek, Jalor. 25th July, 1901.

'This species is not uncommon in thick jungle in the Patani States, and is frequently disturbed as one forces one's way through undergrowth. It rests in dark places, with its wings spread out flat, and is most inconspicuous. One specimen was captured on the wing at night.'

**Argiva**, *Hübner, Verz. Schmett.*, p. 272 (1818).

101. **Argiva hieroglyphica**

*Phalaena-noctua hieroglyphica*, *Drury, Ins. Exot. ii*, p. 3, pl. 2, fig. 1 (1773).

1 ♀. Biserat, Jalor. 3rd July, 1901.

'Resting among long grass at edge of jungle; afternoon.'

1 ♂. Mabek, Jalor. 22nd July, 1901.

'Dull morning; among low bushes in open ground.'

102. **Argiva caprimulgus**

*Noctua caprimulgus*, *Fabr., Sp. Ins. ii*, p. 210, 6 (1789).

1 ♂. Bukit Besar, Nawngchik. 2,500 feet. 6th May, 1901.

'On roof of hut; night.'

**Agonista**, *Rogenbof, Feld. Reise. Nov. Lep.*, pl. 113, fig. 5, and explanation of plate (1869).

103. **Agonista ciliata**

*Lygniodes ciliata*, *Moore, P.Z.S.* 1867, p. 69.

*Agonista ciliata*, *Swinhoe, Cat. Het. Mus. Oxon. ii*, p. 118 (1900).

3 ♂. Bukit Besar, Nawngchik. 2,500 feet. 2nd May, 1901.

'Flew into hut at night.'

**Ericeia**, *Walker, xiii*, 1089 (1857).

104. **Ericeia eriophora**

*Hulodes eriophora*, *Guen., Noct. iii*, p. 210, 1611 (1852).

1 ♂. Biserat, Jalor. 4th July, 1901. (At light).

1 ♀. Biserat, Jalor. 1st July, 1901. (At light).

Two very small examples, but otherwise quite typical.

#### 105. *Ericeia fraterna*

*Girpa fraterna*, Moore, *Lep. Ceylon* iii, p. 94, pl. 156, figs. 5, 5a (1885).

1 ♂. Biserat, Jalor. 30th June, 1901.

‘In room of house ; mid-day.’

2 ♀. Biserat, Jalor. 10th July, 1901. (At light).

This species can easily be distinguished by the round lobe on the hinder margin of the fore wings.

**Panilla**, Moore, *Lep. Ceylon* iii, p. 93, (1885).

#### 106. *Panilla dispila*

*Homoptera dispila*, Walker, xxxiii, 890 (1865).

1 ♂. Biserat, Jalor. 13th July, 1901. (At light).

**Aedia**, Hübner, *Verz. Schmett.*, p. 260, (1818).

*Anophia*, Guen., *Ann. Soc. Ent. Fr.* x, p. 81 (1841).

#### 107. *Aedia acronyctoides*

*Anophia acronyctoides*, Guen., *Noct.* iii, p. 47, 1378 (1852).

1 ♀. Biserat, Jalor. 8th July, 1901.

‘At sunset ; resting, with wings partially expanded, on trunk of an *Areca* palm, with the bark of which it harmonized exactly.’

**Lacera**, Guen., *Noct.* iii, p. 336 (1852).

#### 108. *Lacera alope*

*Phalaena-noctua alope*, Cram., *Pap. Exot.* iii, pl. 286, figs. E, F (1782).

3 ♀. Biserat, Jalor. 29th June and 3rd July, 1901. (At light).

**Achaea**, Hübner, *Verz. Schmett.*, p. 269 (1818).

#### 109. *Achaea melicerte*

*Phalaena-noctua melicerte*, Drury, *Ill. Exot. Ins.* i, p. 46, pl. 23, fig. 1 (1770).

1 ♂. Patani. 23rd June, 1901.

‘Resting on under surface of tiles of roof in town ; late afternoon.’

**Ophiusa**, *Ochs., Eur. Schmett.* iv, p. 93 (1816).

**110. Ophiusa arcuata**

*Ophiusa arcuata*, *Moore, P.Z.S.* 1877, p. 609.

1 ♀. Biserat, Jalor. 1st July, 1901. (At light).  
Selangor.

**111. Ophiusa onelia**

*Naxa onelia*, *Guen., Noct.* iii, p. 258, 1679 (1852).

1 ♂. Biserat, Jalor. 1st July, 1901. (At light).

**Thyas**, *Hübner, Sammel. Exot. Schmett.* ii, p. 4 (1806).

**112. Thyas honesta**

*Thyas honesta*, *Hübner, loc. cit.*, fig. 1.

1 ♂. Bukit Besar, Nawngchik. 2,500 feet. 13th May, 1901.

‘Sitting on jungle floor ; late afternoon. Hind wings and body concealed beneath fore wings.’

**113. Thyas dotata**

*Noctua dotata*, *Fabr. Ent. Syst.* iii (2), p. 55, 153 (1794).

1 ♀. Biserat, Jalor. 28th June, 1901. (At light).

**Anereuthina**, *Hübner, Zutr.* ii, p. 21, No. 163 (1823).

**114. Anereuthina lilach**

*Hypaetra lilach*, *Guen., Noct.* iii, p. 260, 1688 (1852).

*Anereuthina lilach*, *Swinboe, Cat. Het. Mus. Oxon.* ii, p. 148 (1900).

*Hypaetra ocularia*, *Swinboe, Trans. Ent. Soc. London*, 1890, p. 246, pl. 8, fig. 4.

1 ♀. Biserat, Jalor. 29th June, 1901. (At light).

**Bocula**, *Guen., Noct.* iii, p. 295 (1852).

*Borsippa*, *Walker*, xv, 1756 (1858).

**115. Bocula hypenoides**

*Cosmia hypenoides*, *Moore, P.Z.S.* 1881, p. 354, pl. 38, fig. 19.

1 ♀. Biserat, Jalor. 28th June, 1901. (At light).

**Remigia**, *Guen.*, *Noct.* iii, p. 312 (1852).

**116. Remigia frugalis**

*Noctua frugalis*, *Fabr.*, *Syst. Ent.* iii, 2, p. 138, vi, p. 601 (1775).

1 ♀. Jeram Kawan, South Perak. 13th February, 1902. (At light).

**Platyja**, *Hübner*, *Verz. Schmettl.*, p. 268 (1818).

**117. Platyja sada**, nov.

♀. Of a uniform dark olive brown; fore wings with an erect line of white points at one-third, another a little beyond, not reaching costa, and a third just beyond the middle from a white costal spot curving outwards, and ending in the middle of the wing; four or five white points on the costa before the apex; an indistinct, sinuous row or line of white dots in the disc of both wings, more apparent on the hind wings; a row of white dots pointed with black, close to the margin of both wings; marginal line pale; under side pale brown, with two transverse sinuous brown lines, discal on fore wings, medial on hind, and rather close together; fore wings with a distinct angle in the centre of the outer margin. Expanse of wings,  $1\frac{8}{10}$  inches.

Semangko Pass, Selangor-Pahang boundary. 2,700 feet. May, 1902

**Amphigonia**, *Guen.*, *Noct.* iii, p. 337 (1852).

**118. Amphigonia hepatizans**

*Amphigonia hepatizans*, *Guen.*, *loc. cit.*, p. 338, pl. 24, fig. 12.

1 ♂. Biserat, Jalor. 30th June, 1901. (At light).

**Ophideres**, *Boisd.*, *Faun. Ent. Madag. Lep.*, p. 99 (1834).

**119. Ophideres fullonica**

*Phalaena-noctua fullonica*, *Linn.*, *Syst. Nat.* ii, p. 812, 16 (1759).

2 ♀. Biserat, Jalor. 29th June, 1901, and 6th July, 1901.

'One specimen at light, in house; one flew into house at mid-day, and rested on wall.'

**120. Ophideres discrepans**

*Ophideres discrepans*, *Walker*, xiii, 1227 (1857).

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. (At light, in hut).

1 ♀. Sungkei, South Perak. 6th February, 1902.

**121. Ophideres salaminia**

*Phalaena-noctua salaminia*, *Cram., Pap. Exot.* ii, pl. 174, fig. A (1779).

4 ♀. Biserat, Jalor. 27th June and 8th July, 1901. (At light).

**Arsacia**, *Walker*, xxxiv, 1259 (1865).

**122. Arsacia saturalis**

*Arsacia saturalis*, *Walker*, xxxiv, 1260

1 ♂. Jambu, Jhering. 5th June, 1901.

‘Flying among bushes ; evening.’

**Plusia**, *Ochs., Schmett. Eur.* iv, p. 89 (1816).

**123. Plusia agramma**

*Plusia agramma*, *Guen., Noct.* ii, p. 327, 1136 (1852).

1 ♂. Biserat, Jalor. 13th July, 1901. (At light).

**Tinolius**, *Walker*, iii, 621 (1855).

**124. Tinolius quadrimaculatus**

*Tinolius quadrimaculatus*, *Walker*, xxxi, 281 (1864).

*Tinolius zinga*, *Swinboe, Trans. Ent. Soc. London*, 1890, p. 185, pl. 6, fig. 12.

1 ♀. Biserat, Jalor. 11th July, 1901. (At light).

**FOCILLIDAE**

**Boethantha**, *Walker*, xxxiii, 982 (1865).

*Seneratia*, *Moore, Lep. Ceylon* iii, p. 202 (1885).

**125. Boethantha praecipua**

*Thermesia praecipua*, *Walker*, xxxiii, p. 1056.

*Boethantha praecipua*, *Swinboe, Cat. Het. Mus. Oxon*, ii, p. 186 (1900).

1 ♂. Sungkei, South Perak. 11th February, 1902. (At light).

1 ♀. Sungkei, South Perak. 11th February, 1902. (At light).

**Egnasia**, *Walker*, xvi, p. 216 (1858).

**126. Egnasia sinuosa**

*Egnasia sinuosa*, *Moore, Lep. Atk.*, p. 184 (1882).

1. Biserat, Jalor. 29th June, 1901. (At light).

**Zethes**, *Ramb.*, *Ann. Soc. Ent. Fr.*, 1833, p. 29.

**127. Zethes shivula**

*Marmorinia shivula*, *Guen.*, *Noct.* iii, p. 372 (1852).

1 ♂. Biserat, Jalor. 28th June, 1901. (At light).

**128. Zethes loria**, nov.

♂. Pinkish grey; palpi, head, and thorax brown pink; abdomen with first segment brown, the others with brown pink bands above, containing pale dots; fore wings with a sub-basal brown pink band, limited on each side by a brown sinuous line, the base itself smeared with white; one black dot in the cell, two at end, linear; in the hind wings the mark is lunular; a thin sinuous grey medial line across both wings; a discal duplex line with a whitish centre, bent inwards on to the costa on the fore wings; a submarginal sinuous line; a black marginal line with black submarginal points; the outer third of both wings suffused with brown pink, and on the fore wing a white lunular subapical patch, edged with brown; on the hind wings a large round black spot near the anal angle. Expanse of wings,  $1\frac{3}{10}$  inches.

Biserat, Jalor. 26th June, 1901. (One example). (At light).

Somewhat resembles *Z. plumipes*, HAMPSON, but the white subapical mark in that species is excavated and toothed outwards and straight on its inner side.

**129. Zethes capatra**, nov.

♂. Dull ochreous; palpi with brown bands; head brown; wings irrorated with very minute brown atoms; a very broad brown band from abdominal margin, occupying the basal half of the hind wings, all but the extreme base, extending up the middle of the fore wings to the cell, where it joins a large similarly coloured patch, occupying the apical half, with the exception of the costal and outer margins; a similar coloured patch on the upper half of the outer margin of hind wings; the patches are limited by brown sinuous lines, and there is also a submarginal sinuous line; a black dot at end of cell of fore wings, two on hind wings, and black marginal dots on both wings. Expanse of wings,  $1\frac{4}{10}$  inches.

Sungkei, South Perak. 11th February, 1902. (At light).

**Capnodes**, *Guen.*, *Noct.* iii, p. 374 (1852).

**130. Capnodes finipalpis**

*Thermesia finipalpis*, *Walker*, xv, 1574 (1858).

1 ♀. Biserat, Jalor. 15th July, 1901.

‘Resting in open, on upper surface of leaf of shrub ; dusk.’

**131. Capnodes badia**, nov.

♀. Of a uniform creamy-grey colour ; last joint of palpi white, with a brown band towards its tip ; fore wings with the costal line whitish with black spots ; a brown lunule at end of cell ; antemedial, postmedial, and discal very indistinct, sinuous grey lines, the last the most distinct, with two or three black points ; a large, nearly round red spot, formed of red and yellow lines on the lower disc ; hind wings slightly suffused with brown, and with indications of two diffuse brown discal bands ; both wings with black dots close to the margin, and black dots in the white cilia ; abdomen suffused with brown. Expanse of wings,  $1\frac{6}{10}$  inches.

Selangor.

**Avitta**, *Walker*, xv, 1674 (1858).

**132. Avitta subsignans**

*Avitta subsignans*, *Walker*, xv, 1675.

1 ♀. Biserat, Jalor. 1st July, 1901. (At light).

**DELTOIDIDAE**

**Simplicia**, *Guen.*, *Delt. et. Pyral.*, p. 51 (1854).

**133. Simplicia schaldusalis**

*Bocana schaldusalis*, *Walker*, xvi, 180 (1858).

*Simplicia schaldusalis*, *Swinboe*, *Cat. Het. Mus. Oxon.* ii, p. 197 (1900).

1 ♀. Bukit Besar, Nawngchik. 2,500 feet.

‘On upper surface of leaf in jungle ; morning.’

**Adrapsa**, *Walker*, xvi, 169 (1858).

**134. Adrapsa titysusalis**

*Bocana titysusalis*, *Walker*, xvi, 183.

*Adrapsa titysusalis*, *Swinboe*, *Cat. Het. Mus. Oxon.* ii, App., p. 593, pl. 4, fig. 19 (1900).

1 ♂. Sungkei, South Perak. 9th February, 1902. (At light).

**Oxaenanus**, *Swinhoe*, *Cat. Het. Mus. Oxon.* ii, p. 201 (1900).

**135. Oxaenanus longipalpis**, nov.

♂. Ochreous grey, irrorated with brown atoms; fore wings with four blackish spots on the costa at equal distances apart, a black dot in the cell and a black lunule at its end, three transverse very sinuous brown lines, antemedial, discal, and submarginal, the last outwardly whitish edged, and marked with black on its upper half, with a blackish spot on the middle of the outer margin; hind wings with the central space whitish and unmarked, a black lunule at end of cell, a broad black antemedial band, two other lines corresponding to those on fore wings, and a small blackish suffused space near anal angle; the palpi are of immense length. Expanse of wings, 1 inch. Length of palpi,  $\frac{3}{4}$  inch.

Selangor.

**Pseudaglossa**, *Grote*, *Bull. Buffalo Soc. Nat. Sci.* ii, p. 47 (1874).

**136. Pseudaglossa quadrinotata**

*Hypogramma quadrinotata*, *Walker*, xxxiii, 893 (1865).

*Pseudaglossa quadrinotata*, *Hampson*, *Moths India* iii, p. 40 (1895).

1 ♀. Biserat, Jalor. 20th October, 1902.

‘Flying in small cavern at base of limestone cliff; morning.’

**Hydrillodes**, *Guen.*, *Delt. et Pyral.*, p. 65 (1854).

**137. Hydrillodes lentalis**

*Hydrillodes lentalis*, *Guen.*, *loc. cit.*, p. 66, pl. 5, fig. 3.

1 ♂. Sungkei, South Perak. 9th February, 1902. (At light).

**Bertula**, *Walker*, xvi, 162 (1858).

**138. Bertula abjudicalis**

*Bertula abjudicalis*, *Walker*, xvi, 163.

1 ♂. Bidor, South Perak. 18th January, 1902. (At light).

**Echana**, *Walker*, xvi, 195 (1858).

**139. Echana plicalis**

*Echana plicalis*, *Moore*, *P.Z.S.* 1867, p. 86, pl. 7, fig. 7.

1 ♂. Biserat, Jalor. (At light).

**Zanclognatha**, *Led., Noct.*, p. 211 (1857).

**140. Zanclognatha albapex**

*Nodaria albapex*, *Hampson, Moths India* iii, p. 59 (1895).

2 ♂. Sungkei, South Perak. 9th February, 1902.

**Progonia**, *Hampson, Moths India* iv, *App.*, p. 538, (1896).

**141. Progonia oileusalis**

*Herminia oileusalis*, *Walker*, xvi, 116, (1858).

*Progonia oileusalis*, *Swinhoe, Cat. Het. Mus. Oxon.* ii, p. 197 (1900).

1 ♀. Biserat, Jalor. 1st July, 1901. (At light).

**HYPENIDAE**

**Talapa**, *Moore, P.Z.S.* 1867, p. 82.

**142. Talapa transvitta**

*Hingula transvitta*, *Moore, Lep. Ceylon* iii, p. 551, pl. 215, fig. 1 (1887).

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 24th August, 1901.

‘Flying in jungle, and settling on ground ; late afternoon.’

**Marapana**, *Moore, Lep. Ceylon* iii, p. 227 (1885).

**143. Marapana pulverata**

*Sanys pulverata*, *Guen., Noct.* iii, p. 351, 1822 (1852).

1 ♂. Bidor, South Perak. 20th February, 1902. (At light).

**Hypena**, *Schrank, Faun. Boica* ii (2), p. 163 (1802).

**144. Hypena camptogrammalis**

*Hypena camptogrammalis*, *Hampson, MS. ined.*

4 ♂. Biserat, Jalor. 15th July, 1901. (At light).

1 ♂. Biserat, Jalor. 2nd July, 1901.

‘In sweep-net from sedges ; forenoon.’

**Bomolocha**, *Hübner, Verz. Schmett.*, p. 343 (1818).

**145. Bomolocha laesalis**

*Hypena laesalis*, *Walker*, xvi, 62 (1858).

1 ♂. Biserat, Jalor. 29th June and 1st July, 1901. (At light).

**Luceria**, *Walker*, xix, 853 (1859).

**146. Luceria opiliusalis**

*Luceria opiliusalis*, *Walker*, xix, 853.

*Luceria opiliusalis*, *Swinboe*, *Cat. Het. Mus. Oxon.* ii, p. 853 (1900).

*Rhynchina pallida*, *Hampson*, *Ill. Het. B.M.* viii, p. 92, pl. 147, fig. 5 (1891).

1. Biserat, Jalor. 13th July, 1901. (At light).

**PSEUDO GEOMETRINA**

**EPIPLEMIDAE**

**Epiplema**, *Herr.-Schäff. Samml., aussereur. Schmett.* p. 26 (1850).

**147. Epiplema conflictaria**

*Erosia conflictaria*, *Walker*, xxiii, 851 (1861).

*Epiplema conflictaria*, *Swinboe*, *Trans. Ent. Soc. London*, 1902, p. 594.

2 ♂. Jambu Jhering. 6th and 7th July, 1901.

‘Lying flat on leaves, with inner margin of hind wings covering body.’

1 ♂. Biserat, Jalor. 6th July, 1901. (At light).

**148. Epiplema clathrata**

*Epiplema clathrata*, *Warren*, *Nov. Zool.* iii, p. 347 (1896).

1. Sungkei, South Perak. 6th February, 1902. (At light).

**Dirades**, *Walker*, xxxv, 1650 (1866).

**149. Dirades conifera**

*Dirades conifera*, *Moore*, *Lep. Ceylon* iii, p. 399, pl. 186, fig. 8 (1887).

2 ♂. Biserat, Jalor. 30th June, 1901, and 1st July, 1901. (At light).

Hitherto only recorded from Ceylon. I have it in my collection from Port Blair, Andaman Islands.

**150. Dirades mutans**

*Erosia mutans*, *Butler*, *Ann. Mag. Nat. Hist. (5)* xix, p. 434 (1887).

*Dirades mutans*, *Swinboe*, *Trans. Ent. Soc. London*, 1902, p. 597.

2. Biserat, Jalor. 28th June, 1901, and 2nd July, 1901. (At light).

1. ?

**Gathynia**, *Walker*, xxvi, 1639 (1862).

**151. Gathynia miraria**

*Gathynia miraria*, *Walker*, xxvi, 1639.

1. Biserat, Jalor. 30th June, 1901. (At light).

**MICRONIIDAE**

‘The larger representatives of this family show a remarkable resemblance, most probably adaptive, to butterflies of the genus *Cyrestis*, though the latter have yellow markings on their wings, as well as the blackish pencillings characteristic of both ; in both, these pencillings are displayed on pale wings of a peculiarly angular outline and of relatively great extent, and in both there is a tendency towards the development of “tails” to the hind wings, with black “eyes” at their point of origin. Both the moths and the butterflies in this association have the habit of resting on leaves, with the wings spread out flat in the same plane as the body ; but while the butterflies choose the lower surface of the leaves, the Microniidae prefer the upper surface. In this position the moths have a vague and general resemblance to a particularly fluid bird’s drooping ; but, judging from the number of occasions on which I have seen their wings lying scattered on the jungle floor, they are very liable to be eaten by birds, reptiles, or small mammals. *Cyrestis periander* (Fabr.) is common among the low undergrowth, which consists largely of a prickly, holly-like shrub, at the base of the limestone cliffs round Biserat and Kampong Jalor, and the Microniidae are often found in the same environment. Some of them are attracted to light at night.’

**Strophidia**, *Hübner*, *Verz. Schmett.*, p. 290 (1818).

**152. Strophidia fasciata**

*Phalaena-Geometra fasciata*, *Cram.*, *Pap. Exot.* ii, p. 12, pl. 104, fig. D (1779).

1 ♂. Bukit Besar, Nawngchik. 2,500 feet. 7th June, 1901. (At light).

**Acropterus**, *Hübner*, *Geyer*, *Zutrage* iv, p. 38 (1832).

**153. Acropterus striataria**

*Phalaena-Geometra striataria*, *Clerck*, *Icones*, pl. 55, fig. 4 (1759).

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 30th April, 1901.

‘On jungle path ; daytime.’

**154. Acropteris ciniferaria**

*Micronia ciniferaria*, *Walker*, xxxv, 1642 (1866).

*Acropteris ciniferaria*, *Swinhoe*, *Cat. Het. Mus. Oxon.* ii, p. 226 (1900).

1 ♂. Biserat, Jalor. 7th July, 1901.

‘On leaf in jungle, with wings spread flat.’

**155. Acropteris iphiata**

*Micronia iphiata*, *Guen.*, *Phal.* ii, p. 29, 932 (1857).

1 ♂. Mabek, Jalor. 25th July, 1901.

‘With wings flat, on leaf in jungle ; mid-day.’

**156. Acropteris vagata**

*Micronia vagata*, *Moore*, *P.Z.S.* 1877, p. 622, pl. 60, fig. 18.

1 ♂. Biserat, Jalor. 24th October, 1901.

‘Resting, with wings flat, on leaf.’

**Micronia**, *Guen.*, *Phal.* ii, p. 22 (1857).

**157. Micronia aculeata**

*Micronia aculeata*, *Guen.*, *loc. cit.*, pl. 13, fig. 8 ♀.

1 ♀. Biserat, Jalor. 1st November, 1901.

1 ♀. Mabek, Jalor. 2nd July, 1901.

‘Resting, with wings flat, on leaf ; morning.’

**GEOMETRINA****BOARMIIDAE**

**Xeropteryx**, *Butler*, *Journ. Linn. Soc. London*, xvii, p. 203 (1883).

**158. Xeropteryx simplicior**

*Xeropteryx simplicior*, *Butler*, *loc. cit.*, p. 204.

1 ♂. (At light).

**Ourapteryx**, *Leach*, *Zool. Misc.*, p. 79 (1814).

**159. Ourapteryz podaliriata**

Urapteryx podaliriata,<sup>3</sup> *Guen., Phal.* i, p. 32 (1857).

Ourapteryx podaliriata, *Swinhoe, Cat. Het. Mus. Oxon.* ii, p. 229 (1900)

1 ♂. Bayu, Jalor. 9th July, 1901.

‘Flying, at 9 a.m., in thick plantation, and settling on under surface of leaf.’—H.C.R.

‘Both this species and a preceding one resemble the Microniidae in the form and markings of their wings, but the pencillings are somewhat paler, and the size of the moths is considerably greater. Probably they resemble them also in habits.’

**Leucetaera**, *Warren, Nov. Zool.* i, p. 405 (1894).

**160. Leucetaera inamata**

Acidalia inamata, *Walker, xxii*, 755 (1861).

1 ♀. Biserat, Jalor. 3rd July, 1901.

‘Resting on twig of bush in jungle, with wings depressed and abdomen raised in the air.’

**Lomographa**, *Hübner, Verz. Schmett.* p. 311 (1818).

**161. Lomographa quadrilineata**

Heterostegane quadrilineata, *Warren, Nov. Zool.* i, p. 406 (1894).

1. Biserat, Jalor. 2nd July, 1902.

‘Resting on wall of house ; late afternoon.’

**Corymica**, *Walker, xx*, 231 (1860).

**162. Corymica vitrigera**

Corymica vitrigera, *Butler, Ill. Het. B.M.* vii, p. 101, pl. 135, fig. 14 (1889).

1 ♂. Bukit Besar, Nawngchik. 2,500 feet.

‘Flying in jungle ; daytime.’

**163. Corymica deducta**

Caprilia deducta, *Walker, xxxv*, 1569 (1866).

Corymica caustolomaria, *Moore, Lep. Atk.*, p. 231 (1888).

Corymica gensanaria, *Leech, Entom. Suppl.*, p. 56 (1896).

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 5th September, 1901.

‘Resting among long grass ; early morning.’

Nearest the form *gensanaria*, with the wings irrorated with chestnut red ; but, except as to the shades of colouring, all these forms are identical, and I think *C. arnearia* var. *brunnea*, WARREN, *Nov. Zool.* iii, p. 144 (1896), from the Khasia Hills, belongs to this species ; I have in my collection some specimens from the Khasia Hills identical with *deducta*, WALKER, and *caustolomaria*, MOORE, and some more or less irrorated with chestnut red.

**Hypochrosis**, *Guen.*, *Phal.* ii, p. 536 (1857).

**164. Hypochrosis sternaria**

*Hypochrosis sternaria*, *Guen.*, *loc. cit.*, p. 537, 1775.

1 ♂. Bukit Jalor, Jalor ; circa 300 feet. 29th October, 1901.

‘ Resting among dead leaves in jungle ; closely resembling environment.’

**165. Hypochrosis lycoraria**

*Hypochrosis lycoraria*, *Guen.*, *Phal.* ii, p. 538, 1778 (1857).

Selangor.

**Achrosis**, *Guen.*, *Phal.* ii, p. 539 (1857).

**166. Achrosis pyrrhularia**

*Achrosis pyrrhularia*, *Guen.*, *loc. cit.*

1 ♂, 1 ♀. Biserat, Jalor. 3rd and 8th July, 1901.

‘ Resting, with wings spread flat, on leaves of shrubs in jungle.’

**Hyposidra**, *Guen.*, *Phal.* ii, p. 150 (1857).

**167. Hyposidra talaca**

*Lagyra talaca*, *Walker*, xx, 59, ♀ (1860).

*Chizala deceptura*, *Walker*, xx, 264, ♂.

1 ♀. Biserat, Jalor. 13th July, 1901. (At light).

**Hyperythra**, *Guen.*, *Phal.* i, p. 99 (1857).

**168. Hyperythra lutea**

*Phalaena-Geometra lutea*, *Cram.*, *Pap. Exot.* iv, pl. 370, fig. C, D (1782).

1 ♂. Biserat, Jalor. 20th October, 1901.

‘ Flying among undergrowth in plantation ; sunset.’

1 ♂. Sungkei, South Perak. 11th February, 1902. (At light).

**Fascellina**, *Walker*, xx, 215 (1860).

**169. Fascellina chromataria**

*Fascellina chromataria*, *Walker*, xx, 215, ♀.

*Geometra usta*, *Walker*, xxxv, 1602, ♂ (1866).

1 ♂. Biserat, Jalor. 12th July, 1901. (At light).

**Luxiaria**, *Walker*, xx, 231 (1860).

**170. Luxaria exclusa**

*Hemerophila exclusa*, *Walker*, xxi, 320 (1860).

1 ♂. Biserat, Jalor. 2nd July, 1901.

‘Resting, with wings spread flat, on leaf; late afternoon.’

**Gyadroma**, *Swinboe*, *Trans. Ent. Soc. London*, 1894, p. 220.

**171. Gyadroma testacearia**

*Ennomos testacearia*, *Moore*, *P.Z.S.* 1867, p. 623.

*Gyadroma testacearia*, *Swinboe*, *loc. cit.*

Selangor.

**Elphos**, *Guen. Pbal.* i, p. 285 (1857).

**172. Elphos albifascia**

*Elphos albifascia*, *Warren*, *Nov. Zool.* i, p. 430 (1894).

1 ♂. Biserat, Jalor. 3rd July, 1901. (In jungle).

1 ♂. Bukit Besar, Nawngchik. 2,100 feet. 8th May, 1901.

‘Flying in jungle; settling on a tree-trunk with wings spread flat, it became practically invisible, despite its large size.’

**Ectropis**, *Hübner*, *Verz. Schmett.*, p. 299 (1818).

**173. Ectropis recticomata**, nov.

♂. Uniform dull ochreous grey; shaft of antennae and top of head whitish; antennae bipectinate, branches grey; abdomen with two tufts; forewings with fovea; costa with four brown marks, being the commencement of four transverse, indistinct, greenish-grey bands, sub-basal, antemedial, medial, and discal, at equal distances apart; continuations of the second and fourth

only apparent on hind wings ; a submarginal still more indistinct band ; the outer margins grey, crenulate, and with fine brown points on the veins ; underside whitish, with very broad marginal blackish bands, the extreme margin whitish. Expanse of wings, 1 inch.

Bukit Besar, Nawngchik. 2,500 feet. (One example). (At light, in hut).

**Boarmia**, *Treit., Schmett. Eur.* V. ii, p. 433 (1825).

**174. Boarmia trispinaria**

*Boarmia trispinaria*, *Walker*, xxiii, 378 (1860).

1 ♂. Biserat, Jalor. 6th July, 1901.

‘On tree-trunk in jungle ; afternoon.’

**175. Boarmia lioptilaria**, nov.

♂, ♀. Uniform dark grey, with an ochreous tinge, densely irrorated with brown atoms ; shaft of antennae luteous, pectinations for three-fourths length blackish in colour ; a brown ringlet at end of each cell, larger on the hind wings in both sexes ; fore wings crossed by four sinuous, semidentate brown lines, antemedial, medial, postmedial, and submarginal, the second and third inclining towards each other hindwards ; hind wings crossed by three similar lines, two in the middle, rather close together, and the third discal, somewhat near the margin ; black marginal lunules on both wings. Expanse of wings,  $1\frac{8}{10}$  inches.

Selangor ♂ type.

Penang ♀ B.M. collection.

It has a great resemblance to *B. ratotaria*, SWINHOE, from Assam.

**ORTHOSTIXIDAE**

**Eumelea**, *Westw. Duncan's Nat. Hist. Libr.* xxxii, *Exot. Moths*, p. 215 (1841).

**176. Eumelea rosalia**

*Phalaena-Geometra rosalia*, *Cram., Pap. Exot.* iv, p. 152, pl. 368, fig. F (1782).

4 ♀. Biserat, Jalor. 21st May—26th July, 1901.

1 ♀. Mabek, Jalor. 27th July, 1901.

1 ♂. Telôm, Perak-Pahang Border. 4,000 feet. 24th January, 1902.

‘Common among low undergrowth in the jungle, especially at the base of limestone cliffs, near Biserat.’

**177. Eumelea aureliata**

*Eumelea aureliata*, *Guen.*, *Pbal.* i, p. 394, pl. 22, fig. 6 (1857).

1 ♀. Biserat, Jalor. 8th July, 1901.

1 ♀. Mabek, Jalor.

‘The specimens were taken resting under leaves, in low undergrowth, with the abdomen hanging downwards, the ventral surface of the wings being pressed against the lower surface of the leaves. When disturbed on the wing both *E. rosalia* and *E. aureliata* settle and take up this attitude.

**Celerena**, *Walker*, *Trans. Ent. Soc. London* (3) i, p. 72, (1862).

**178. Celerena siamica**

*Celerena siamica*, *Swinhoe*, *Ann. Mag. Nat. Hist. ined.*

2 ♂, 2 ♀. Biserat, Jalor. 4th and 7th July, 1901.

2 ♀. Mabek, Jalor. 23rd and 28th July, 1901.

1. Bukit Besar, Nawngchik. 1,000. 7th September, 1901.

‘Common among undergrowth in jungle, especially at Mabek ; flight very strong and sustained, resembling that of many butterflies.’

**Rambara**, *Moore*, *Lep. Ceylon* iii, p. 458 (1887).

**179. Rambara lumenaria**

*Arrhostia lumenaria*, *Hübner*, *Geyer Zutr.* iv, p. 35, fig. 757, 758 (1832).

2 ♀. Biserat, Jalor. 3rd and 7th July, 1901.

‘At light, and flying in secondary jungle in the afternoon.’

**180. Rambara saponaria**

*Zanclopteryx saponaria*, *Guen.*, *Pbal.* ii, p. 16, 915 (1857).

1 ♂. Biserat, Jalor. 5th July, 1901. (At light).

**Ozola**, *Walker*, xxiv, 1080 (1861).

**181. Ozola macariata**

*Zarmigethusa macariata*, *Walker*, xxvi, 1637 (1862).

*Ozola macariata*, *Swinhoe*, *Trans. Ent. Soc. London*, 1902, p. 645.

1 ♂. Biserat, Jalor. 14th July, 1901. (At light).

## LARENTIIDAE

**Collix**, *Guen.*, *Pbal.* ii, p. 357 (1857).

182. **Collix icteraria**, nov.

♀ Brown, with a pinkish tinge; abdomen, with whitish segmental lines; transverse lines on forewings white, edged with black and brown, outwardly curved; first sub-basal, second and third close together, one-third from base; fourth discal; a black patch or suffusion inside it, towards costa; a similar patch outside the third line; a sub-apical patch, and one a little above the middle near outer margin; many whitish semidentate transverse lines very indistinct, and the whole of the hind wings covered with similar lines a little more distinct; marginal line and cilia ochreous; underside whitish, markings very prominent; a black spot at end of each cell, a black dentated band across middle of both wings, some paler grey bands on the inner portions, and a broad discal band; no longitudinal streaks. Expanse of wings,  $1\frac{1}{10}$  inches.

Selangor.

## STERRHIDAE

**Craspedia**, *Hübner*, *Verz. Schmett.*, p. 312 (1818).

183. **Craspedia nesciaria**

*Acidalia nesciaria*, *Walker*, xxii, 750 (1861).

1 ♂.	Sungkei, South Perak.	11th February, 1902.	(At light).
1 ♀.	Biserat, Jalor.	15th July, 1901.	(At light).
	Selangor.	May, 1902.	

184. **Craspedia aspilataria**

*Acidalia aspilataria*, *Walker*, xxiii, 791 (1861).

*Acidlia aspilataria*, *Hampson*, *Moths India* iii, p. 432 (1895).

Selangor.

**Lycauges**, *Butler*, *Ann. Mag. Nat. Hist.* (5) iv, p. 373 (1879).

185. **Lycauges anaitisaria**

*Acidalia* (?) *anaitisaria*, *Walker*, xxiii, 795 (1861).

1 ♀.	Mabek, Jalor.	23rd July, 1901.
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‘Resting on leaf in jungle; mid-day.’

**Chrysocraspeda**, *Hampson, Moths Ind.* iii, p. 443 (1895).

**186. Chrysocraspeda rubricata, nov.**

♂. The ground colour pale primrose, nearly the entire surface of the fore wings streaked and irrorated with rufous, leaving a primrose small space near the base and a larger one outside the upper end of the cell; a brown short line at the end of the cell, and indications on the hind margin of interior, central, and discal transverse lines; the hind wings are pale primrose coloured, with thin rufous bands and some basal rufous marks; an ante-medial straight band, a discal duplex, outwardly curved band, with a streak curving down between them from the costa, where they join; both wings angled in the middle, and with rufous marginal thin bands. Expanse of wings, 1 inch.

Bukit Besar, Nawngchik. 2,000 feet.

'On dead banana leaves in stream; morning.'

**Somatina**, *Guen., Phal.* ii, p. 10, (1857).

**187. Somatina anthophilata**

*Somatina anthophilata*, *Guen., loc. cit.*, p. 11, pl. 18, fig. 2.

1 ♀.

'Resting on leaf; early morning.'

**Nobilia**, *Walker*, xxiv, 1098 (1862).

**188. Nobilia turbata**

*Nobilia turbata*, *Walker*, xxiv, 1098.

1 ♂. Sungkei, South Perak. 10th February, 1902. (At light).

**GEOMETRIDAE**

**Dysphania**, *Hübner, Verz. Schmett.*, p. 175 (1818).

**189. Dysphania militaris**

*Phalaena militaris*, *Linn., Mus. Lud. Utr.*, p. 375 (1764).

*Dysphania militaris*, *Swinhoe, Cat. Het. Mus. Oxon.* ii, p. 379 (1900).

*Euschema abrupta*, *Walker, Trans. Ent. Soc. London*, 1859, p. 70.

2 ♂. Jor, South Perak. Circa 2,000 feet. 16th January, 1902.

**190. Dysphania malayaria**

Hazis malayaria, *Guen., Uran. et Phal.* ii, p. 189 (1857).

1 ♂. Mata Rusa, near Biserat, Jalor. 7th August, 1901.

‘In undergrowth; early morning.’

**191. Dysphania aurilimbata**

Euschema aurilimbata, *Moore, P.Z.S.* 1878, p. 846.

Dysphania supergressa, *Warren, Nov. Zool.* ii, p. 87 (1895).

1 ♀. Bukit Jalor, Jalor. 28th June, 1901.

‘On wing in bright sunshine; early afternoon.’

**192. Dysphania subrepleta**

Euschema subrepleta, *Walker*, ii, 406 (1854).

Hazis bellonaria, *Guen., Phal.* ii, p. 193, pl. 18, fig. 1 (1857).

Euschema sodalis, *Moore, Journ. As. Soc. Beng.* lv. (2), p. 99 (1886).

2 ♂. Jor, South Perak. Circa 2,000 feet. 16th January, 1902.

‘These specimens were taken, together with those representing *D. militaris*, in the early morning, resting on a rock in the stream and evidently half paralysed with cold.’

**Pseudoterpna**, *Hübner, Verz. Schmett.*, p. 248 (1818).

**193. Pseudoterpna chlora**

Phalaena chlora, *Cram., Pap. Exot.* iv, p. 233, pl. 398, fig. C (1782).

1 ♂. Jeram Kawan, South Perak. 15th February, 1902.

**Ornithospila**, *Warren, Nov. Zool.* i, p. 386 (1894).

**194. Ornithospila avicularia**

Geometra avicularia, *Guen., Phal.* i, p. 342, 526 (1857).

2 ♀. Biserat, Jalor. 2nd to 4th July, 1901.

‘Flying in jungle after rain; afternoon.’

**THYRIDIDAE**

**Striglina**, *Guen., Ann. Soc. Ent. Fr.* (5) vii, p. 283 (1877).

**195. Striglina decussata**

Sonagara decussata, *Moore, P.Z.S.* 1883, p. 27, pl. 6, fig. 8.

1 ♂. Sungkei, South Perak. 10th February, 1902. (At light).  
Selangor.

**Rhodoneura**, *Guen., Sp. Gen. Lep. Phal.* ii, pl. 1, fig. 8, (1857).

**196. Rhodoneura marmorealis**

*Rhodoneura marmorealis*, *Moore, P.Z.S.* 1877, p. 617.

1 ♂. Biserat, Jalor. 4th July, 1901. (In jungle).

**197. Rhodoneura capotona**, nov.

♂. Ground colour ochreous grey, striated, and marked with chestnut brown; a band behind the head; fore wings with whitish patches on the costa, and many transverse pale chestnut bands; both wings with a broad dark-brown band from abdominal margin above the anal angle to near the costa of forewings, one-third from apex; this band is nearly straight, and fairly uniform in breadth, except that in nearing the costa it terminates in a large round patch; the underside is whitish, tinged with ochreous, with the markings more patchy and less developed; abdomen long, double the breadth of hind wings; anal tufts large. Expanse of wings,  $1\frac{7}{10}$  inches.

Selangor.

Resembles *R. reticulata*, MOORE, in shape of wings.

**Addaea**, *Walker*, xxxiv, 1201 (1865).

**198. Addaea trimeronalis**

*Pyralis* (?) *trimeronalis*, *Walker*, xix, 916 (1859).

*Addaea trimeronalis*, *Hampson, P.Z.S.* 1897, p. 632 (fig.)

1. Mabek, Jalor. 23rd July, 1901.

'Resting on leaf in jungle; mid-day.'

**CRAMBIDAE**

**Chilo**, *Zinck., Germar's Mag. Ent.* ii, p. 33 (1817).

**199. Chilo simplex**

*Jartheza simplex*, *Butler, P.Z.S.* 1880, p. 690.

- |    |                       |                      |
|----|-----------------------|----------------------|
| 2. | Patani.               | 19th June, 1901.     |
| 1. | Biserat, Jalor.       | 10th July, 1901.     |
| 1. | Bidor, South Perak.   | 2nd February, 1902.  |
| 2. | Sungkei, South Perak. | 11th February, 1902. |

(All at light).

**200. Chilo suppressalis**

*Crambus suppressalis*, *Walker*, xxvii, 166 (1863).

*Chilo suppressalis*, *Hampson*, *P.Z.S.* 1895, p. 957.

1. Patani. 9th October, 1901.
3. Biserat, Jalor. 7th and 13th July, 1901.

(All at light).

**Crambus**, *Fabr.*, *Ent. Syst. Suppl.*, p. 464 (1798).

**201. Crambus tonsalis**

*Myeza tonsalis*, *Walker*, xxvii, 190 (1863).

*Crambus tonsalis*, *Hampson*, *P.Z.S.* 1895, p. 926.

- 1 ♂. Bidor, South Perak. 21st February, 1902. (At light).

**Ancylolomia**, *Hübner*, *Verz. Schmett.*, p. 363 (1818).

**202. Ancylolomia chrysographella**

*Chilo chrysographellus*, *Kollar*, *Hüg. Kasch.* iv, p. 494 (1844).

2. Biserat, Jalor. 1st and 13th July, 1901. (At light).

**SCHOENOBIIDAE**

**Scirpophaga**, *Treit.*, *Schmett. Eur.* ix, i, p. 55 (1832).

**203. Scirpophaga auriflua**

*Scirpophaga auriflua*, *Zeller*, *Mon. Chil. et Cramb.*, p. 2 (1863).

7. Biserat, Jalor. 15th and 20th October, 1901, and 18th July, 1901.
2. Sungkei, South Perak. 6th February, 1902.

(All at light).

**Schoenobius**, *Dup.*, *Cat. Lep. Eur.*, p. 312 (1844).

**204. Schoenobius bipunctifera**

*Tipanaea bipunctifera*, *Walker*, xxviii, 523 (1863).

1. Sungkei, South Perak. 7th February, 1902.
1. Biserat, Jalor. 6th July, 1901.

(Both at light).

**205. Schoenobius dodatellus**

*Chilo dodatellus*, *Walker*, xxx, 966 (1864).

*Schoenobius dodatellus*, *Hampson*, *Moths India* iv, p. 48 (1896).

- |           |                       |  |
|-----------|-----------------------|--|
| 1 ♂, 3 ♀. | Biserat, Jalor.       | 13th July, 1901, and 9th August, 1901. |
| 1 ♂.      | Sungkei, South Perak. | 6th February, 1902.                    |
| 1 ♀.      | Bidor, South Perak.   | 22nd February, 1902.                   |
- (All at light).

**206. Schoenobius immeritalis**

*Dosara immeritalis*, *Walker*, xix, 830 (1859).

*Schoenobius immeritalis*, *Hampson*, *P.Z.S.* 1895, p. 915.

1. Biserat, Jalor. 11th July, 1901. (At light).

**ANERASTIIDAE**

**Polyocha**, *Zeller*, *Isis*, 1848, p. 876.

**207. Polyocha anerastica**

*Nephopteryx anerastica*, *Snellen*, *Bijdr. Faun. Midd. Sumatr.* 1880, p. 81.

*Emmalocera anerastica*, *Rag. Mem. sur Lep.* viii, p. 317, pl. 36, f. 8 (1901).

Selangor.

**GALLERIIDAE**

**Prasinoxena**, *Meyrick*, *Trans. Ent. Soc. London*, 1894, p. 479.

**208. Prasinoxena viridissima**, nov.

Head, thorax, and fore wings dark brilliant green; five large yellowish spots, occupying the whole of the outer margin, all with rounded inner sides; the first three from the apex do not quite touch each other, the last two are conjoined; hind wings and abdomen pure white; underside, wings as above, the green of fore wings paler, body and legs bright green, tarsi white. Expanse of wings,  $\frac{1}{2}$  inch.

Selangor.

Somewhat resembling *P. monospila*, MEYRICK, from Borneo, but the apex of the fore wings much more acute, almost falcate, and the outer margin somewhat concave.

**PHYCITIDAE**

**Canthelia**, *Walker*, xxxv, 1726 (1866).

**209. Canthelia lateritalis**

*Eurhodope lateritalis*, *Walker*, xxvii, 74 (1863).

- |    |                 |                    |
|----|-----------------|--------------------|
| 1. | Biserat, Jalor. | 10th July, 1901.   |
| 1. | Patani.         | 8th October, 1901. |

(Both at light).

**Rhodophaea**, *Guen., Eur. Microlep. Ins. Meth.*, p. 74 (1845).

**210. Rhodophaea heringi**

*Rhodophaea heringi*, *Rag., Ann. Soc. Ent. Fr.*, 1888, p. 282.

*Rhodophaea heringi*, *Rag., Mon. Phyc.*, p. 73, pl. 8, fig. 1 (1893).

1. Biserat, Jalor. 12th July, 1901. (At light).

**Oligochroa**, *Rag., Nouv. Gen.*, p. 20 (1888).

**211. Oligochroa mundalis**

*Nephopteryx mundalis*, *Walker*, xxvii, 67 (1863).

*Oligochroa mundalis*, *Rag. Mem. sur Lep.* vii, p. 387, pl. 12, fig. 11 (1893).

Selangor.

**PYRALIDAE**

**Pyralis**, *Linn, Syst. Nat.* xii, p. 881 (1767).

**212. Pyralis fumipennis**

*Pyralis fumipennis*, *Butler, Ill. Het. B.M.* vii, p. 91, pl. 134, fig. 11 (1889).

12. Goah Tanah (Earth Cave), Bukit Tapang, nr. Biserat, Jalor. 9th July, 1901.

1. Goah Tanah (Earth Cave), Bukit Tapang, nr. Biserat, Jalor. 16th October, 1901.

‘We found numbers of this moth seated on the walls of one of the big limestone caves near Biserat, and did not see it elsewhere. It was only observed in that part of the cave that was absolutely dark, and, so far as we could judge, did not penetrate into the extremity, which was partially lighted by holes in the roof. It was not attracted to the light of our torches and lanterns. Very possibly the species only shelters in the cave during the day, for it is almost inconceivable that it should be truly cavernicolous, in the sense of being a regular denizen, being born, breeding, and dying in the cave without ever coming to the exterior.’

**ENDOTRICHIDAE**

**Cotachena**, *Moore, Lep. Ceylon* iii, p. 275 (1885).

**213. Cotachena histricalis**

*Botys histricalis*, *Walker*, xviii, 655 (1859).

2. Jeram Kawan, South Perak. 13th February, 1902. (At light).

## NYMPHULIDAE

**Nymphula**, *Schrank, Faun. Boic.* ii (2), p. 162 (1802).

214. **Nymphula affinialis**

*Paraponyx affinialis*, *Guen., Delt. et Pyral.*, p. 259, 270 (1854).

2. Biserat, Jalor. 11th and 13th July, 1901. (At light).

**Stenia**, *Guen., Dup. Cat. Méth.*, p. 201 (1844).

215. **Stenia spodinopa**

*Symmoracma spodinopa*, *Meyrick, Trans. Ent. Soc. London*, 1894, p. 469.

*Stenia spodinopa*, *Hampson, Trans. Ent. Soc. London*, 1897, p. 207.

1. Biserat, Jalor. 1st July, 1901. (At light).

**Erilita**, *Led., Wien. Ent. Mon.* vii, p. 426 (1863).

216. **Erilita admixtalis**

*Botys admixtalis*, *Walker*, xviii, 665 (1859).

1. Sungkei, South Perak. 6th February, 1902. (At light).

## PYRAUSTIDAE

**Aripa**, *Moore, Lep. Ceylon* iii, p. 312 (1886).

217. **Aripa caberalis**

*Spilomela caberalis*, *Guen., Delt. et Pyral.*, p. 284, 282 (1854).

1. Biserat, Jalor. 29th June, 1901. (At light).

**Syngamia**, *Guen. Delt. et Pyral.*, p. 187 (1854).

218. **Syngamia xanthalis**

*Syngamia xanthalis*, *Hampson, P.Z.S.* 1898, p. 644.

1. Jeram Kawan, South Perak. 13th February, 1902. (At light).

219. **Syngamia floralis**

*Stenia floralis*, *Zeller, K. Vet-Ak. Handl.*, 1852, p. 6.

2. Biserat, Jalor. 13th and 16th July, 1901.

‘One at light ; one flying very low over bare ground in open at mid-day.’

**Rhimphaleodes**, *Hampson, Ill. Het.* ix, p. 174 (1893).

**220. Rhimphaleodes macrostigma**

*Rhimphaleodes macrostigma*, *Hampson, loc. cit.*, pl. 174, fig. 9.

1. Biserat, Jalor. 28th June, 1901. (At light).

**Epimima**, *Meyrick, Trans. Ent. Soc. London*, 1886, p. 235.

**221. Epimima bilinealis**

*Dolichosticha bilinealis*, *Hampson, Ill. Het. B.M.* viii, p. 139, pl. 155, fig. 25 (1891).

*Marasmia bilinealis*, *Hampson, Moths India* iv, p. 277 (1896).

1. Biserat, Jalor. 13th July, 1901.

**Ravanoa**, *Moore, Lep. Ceylon* iii, p. 284 (1885).

**222. Ravanoa xiphialis**

*Zebronia xiphialis*, *Walker*, xvii, 483 (1859).

1. Biserat, Jalor. 24th October, 1901. (At light).

**Eurrhyarodes**, *Snellen, Tijds. v. Ent.* xxiii, p. 215 (1880).

**223. Eurrhyarodes bracteolalis**

*Botys bracteolalis*, *Zeller, Caffr.*, p. 30 (1852).

1. Biserat, Jalor. 20th October, 1901. (At light).

**Agrotera**, *Schrank, Faun. Boica* ii, p. 163 (1798).

**224. Agrotera coelatalis**

*Nistra coelatalis*, *Walker*, xvii, 488 (1859).

1. Biserat, Jalor. 29th June, 1901.

1. Sungkei, South Perak. 11th February, 1902.  
(Both at light).

**225. Agrotera effertalis**

*Aediodes effertalis*, *Walker*, xvii, 348 (1859).

*Agrotera effertalis*, *Hampson, Ill. Het. B.M.* ix, p. 173, pl. 174, fig. 19 (1893).

Selangor.

**Bocchoris**, *Moore, Lep. Ceylon* iii, p. 271 (1885).

**226. Bocchoris onychinalis**

*Asopia onychinalis*, *Guen., Delt. et Pyral*, p. 158, 205 (1854).

3. Jor, Perak-Pahang border. Circa 2,000 feet. 27th January, 1902. (At light).

**Platamonia**, *Led., Wien. Ent. Mon.* vii, p. 427 (1863).

**227. Platamonia camillusalis**

*Botys camillusalis*, *Walker*, xviii, 713 (1859).

1. ?

‘Flying in jungle ; late afternoon.’

**Pinacia**, *Hübner, Zutrage* iv, p. 15 (1832).

**228. Pinacia fulvidorsalis**

*Pinacia fulvidorsalis*, *Hübner, loc. cit.*, figs. 643, 644.

2. Biserat, Jalor. 1st July, 1901. (At light).

**Tyspanodes**, *Warren, Ann. Mag. Nat. Hist.* (6) vii, p. 425 (1891).

**229. Tyspanodes exathesalis**

*Euglyphis exathesalis*, *Walker*, xix, 978 (1859).

*Tyspanodes exathesalis*, *Swinboe, Cat. Het. Mus. Oxon* ii, p. 474, pl. 6, fig. 16 (1900).

Selangor.

**Saroscelis**, *Meyrick, Trans. Ent. Soc. London*, 1894, p. 461.

**230. Saroscelis nicoalis**

*Botys nicoalis*, *Walker*, xviii, 700 (1859).

*Saroscelis nicoalis*, *Swinboe, Cat. Het. Mus. Oxon* ii, p. 475, pl. 8, fig. 3 (1900).

1. Jeram Kawan, South Perak. 13th January, 1902. (At light).

**Dichocrocis**, *Led., Wien. Ent. Mon.*, 1863, p. 447.

**231. Dichocrocis bilinealis**

*Dichocrocis bilinealis*, *Hampson, Moths India* iv, p. 306 (1896).

1. Patani. 9th October, 1901. (At light).

**232. Dichocrocis punctiferalis**

*Astura punctiferalis*, *Guen., Delt. et Pyral.*, p. 320, 347 (1854).

*Dichocrocis punctiferalis*, *Hampson, P.Z.S.* 1898, p. 690.

Selangor.

**233. Dichocrocis megillalis**

*Botys megillalis*, *Walker*, xviii, 700 (1859).

*Dichocrocis megillalis*, *Swinhoe*, *Cat. Het. Mus. Oxon.* ii, p. 483, pl. 8, fig. 2 (1900).

Selangor.

**Merotoma**, *Meyrick*, *Trans. Ent. Soc. London*, 1894, p. 460.

**234. Merotoma dairalis**

*Botys dairalis*, *Walker*, xviii, 698 (1859).

1. Sungkei, South Perak. 8th February, 1902.

1. Bidor, South Perak. 20th February, 1902.

'Both at light.'

**Goniorhynchus**, *Hampson*, *Moths India* iv, p. 322 (1896).

**235. Goniorhynchus gratalis**

*Botys gratalis*, *Led.*, *Wien. Ent. Mon.* vii, p. 475, pl. 11, fig. 18 (1863).

1. Biserat, Jalor. 20th October, 1901. (At light).

**Endographis**, *Meyrick*, *Trans. Ent. Soc. London*, 1894, p. 464.

**236. Endographis acrochlora**

*Endographis acrochlora*, *Meyrick*, *loc. cit.*, p. 465.

Selangor.

**Endocrossis**, *Meyrick*, *Trans. Ent. Soc. London*, 1889, p. 515.

**237. Endocrossis flavibasalis**

*Botyodes flavibasalis*, *Moore*, *P.Z.S.* 1867, p. 96. ♀

1. Mabek, Jalor. 24th July, 1901.

'At light, in hut.'

**Pramadea**, *Moore*, *Lep. Atk.*, p. 211 (1888).

**238. Pramadea lunalis**

*Botys lunalis*, *Guen.*, *Delt. et Pyral.*, p. 352, 417 (1854).

1. Biserat, Jalor. 11th July, 1901.

1. Sungkei, South Perak. 11th February, 1902.

'Both at light.'

**239. Pramadea luctuosalis**

*Hyalitis luctuosalis*, *Guen., Delt. et Pyral.*, p. 290, 291 (1854).

1. Sungkei, South Perak. 6th February, 1902. (At light)

**Sylepta**, *Hübner, Verz. Schmett.*, p. 356 (1818).

**240. Sylepta ogoalis**

*Botys ogoalis*, *Walker*, xviii, 689 (1859).

*Coptobasis colomboensis*, *Moore, Lep. Ceylon* iii, p. 556, pl. 215, fig. 13 (1887).

1. Biserat, Jalor. 28th June, 1901.  
1. Jor, Perak-Pahang border. 2,000 feet. 27th January, 1902.

‘Both at light, in house.’

**Lygropia**, *Led., Wien. Ent. Mon.* vii, 381 (1863).

**241. Lygropia amyntusalis**

*Botys amyntusalis*, *Walker*, xviii, 662 (1859).

*Lygropia amyntusalis*, *Swinhoe, Cat. Het. Mus. Oxon.* ii, p. 497 (1900).

3. Biserat, Jalor. 1st to 14th July, 1901. (At light).

**Agathodes**, *Guen., Delt. et Pyral.*, p. 207 (1854).

**242. Agathodes ostentalis**

*Perinephela ostentalis*, *Hübner, Geyer, Zutr.* v, p. 11, fig. 833, 834 (1838).

1. Sungkei, South Perak. 8th February, 1902. (At light).

**Sisyrophora**, *Led., Wien. Ent. Mon.* vii, p. 399.

**243. Sisyrophora pfeifferae**

*Sisyrophora pfeifferae*, *Led., loc. cit.*, pl. 13, fig. 13.

2. Jor, Perak-Pahang border. Circa 2,000 feet. 27th January, 1902. (At light),

**Arthroschista**, *Swinhoe, Cat. Het. Mus. Oxon.* ii, p. 500 (1900).

**244. Arthroschista hilaralis**

*Margaronia hilaralis*, *Walker*, xviii, 532 (1859).

1. Jeram Kawan, South Perak. 13th February, 1902. (At light).

**Margaronia**, *Hübner, Verz. Schmett.*, p. 358 (1818).

**245. Margaronia itysalis**

*Glyphodes itysalis*, *Walker*, xvii, 501 (1859).

1. Biserat, Jalor. 15th October, 1901.

**246. Margaronia actorionalis**

*Glyphodes actorionalis*, *Walker*, xvii, 498 (1859).

1. Jeram Kawan, South Perak. 25th February, 1902. (At light).

**247. Margaronia parvalis**

*Glyphodes parvalis*, *Walker*, xxxiv, 1355 (1866).

1. Biserat Jalor. 29th June, 1902. (At light).

1. ?

**248. Margaronia eburnealis, nov.**

♀. Palpi, frons, shoulders, and band behind the head dark chocolate brown; palpi beneath, wings, body, and legs shining white; tip of abdomen and two broad bands on fore legs chocolate brown; a median band of that colour along costa of fore wings above, and on outer margin of both wings above and below, the band slightly broader on the outer margin than on the costa of the fore wings; fore wings with a brown spot in the middle of the cell and another at its upper end, both touching the costal band, the white of the wings running as a small wedge into the chocolate-brown colour at the apex. Expanse of wings,  $1\frac{2}{10}$  inches.

Bukit Besar, Nawangchik. 2,500 feet. One example.

‘Flying among long grass, after rain; afternoon.’

Something like *M. elealis*, WALKER, from Africa, but that species has much broader marginal bands, and the white does not run into the apex of fore wings.

**249. Margaronia canthusalis**

*Glyphodes canthusalis*, *Walker*, xvii, 505 (1859).

*Botys luciferalis*, *Walker*, xxxiv, 1,412 (1865).

*Glyphodes spectandalis*, *Snellen, Tijds. v. Ent.* xxxviii, p. 138, pl. 6, fig. 1 (1895).

Selangor.

**Polythlipta**, *Led., Wien. Ent. Mon.* vii, p. 389 (1863).

**250. Polythlipta euroalis**

*Nausinoe euroalis*, *Swinhoe, P.Z.S.* 1889, p. 420, pl. 44, fig. 12.

1. Biserat, Jalor. 29th January, 1901. (At light).

**Sameodes**, *Snellen, Tijds. v. Ent.* xxiii, p. 217 (1880).

**251. Sameodes cancellalis**

*Botys cancellalis*, *Zeller, Caffr.*, p. 34 (1852).

2. Biserat, Jalor. 9th and 16th July, 1901.

‘One at light ; one in jungle in the morning.’

**Prophantis**, *Warren, Ann. Mag. Nat. Hist.* (6) viii, p. 113 (1896).

**252. Prophantis octoguttalis**

*Botys octoguttalis*, *Felder, Reise Nov. Lep.*, pl. 135, fig. 38 (1874).

1. Mabek, Jalor. 29th July, 1901.

‘Nat. coll. in jungle.’

**Crochiphora**, *Hübner, Geyer, Samml. Exot. Schmett.* iv, p. 12 (1838).

**253. Crochiphora testulalis**

*Crochiphora testulalis*, *Hübner, loc. cit.*, figs. 629, 630.

1. Sungkei, South Perak. 10th February, 1902. (At light).

**254. Crochiphora amboinalis**

*Siriocauta* (?) *amboinalis*, *Felder, Reise Nov. Lep.*, pl. 135, fig. 24 (1874).

1. Biserat, Jalor. 23rd October, 1901. (At light).  
Selangor.

**Pachyzancla**, *Meyrick, Trans. Ent. Soc. London*, 1884, p. 315.

**255. Pachyzancla mutualis**

*Botys mutualis*, *Zeller, Caffr.*, p. 40, (1852).

1. Biserat, Jalor. 11th July, 1901. (At light).

**Acharana**, *Moore, Lep. Ceylon* iii, p. 285 (1885).

**256. Acharana phaeopteralis**

*Botys phaeopteralis*, *Guen., Delt. et Pyral.*, p. 349, 409 (1854).

4. Biserat, Jalor. 1st to 15th July, 1901. (At light).

**257. Acharana licarsisalis**

*Botys licarsisalis*, *Walker*, xviii, 686 (1859).

1. Biserat, Jalor. 11th July, 1901. (At light).

**Pionea**, *Guen., Delt. et Pyral.*, p. 367 (1854).

**258. Pionea flavofimbriata**

*Mabra flavofimbriata*, *Moore, Lep. Atk.*, p. 208 (1888).

*Pionea flavofimbriata*, *Swinboe* (note), *Ann. Mag. Nat. Hist.* (7) viii, p. 138 (1901).

1. Biserat, Jalor. 23rd October, 1901. (At light).

**Pyrausta**, *Schrank, Faun. Boica* ii (2), p. 163 (1802).

**259. Pyrausta ciniferalis**

*Pyrausta ciniferalis*, *Walker*, xxxiv, 1417 (1865).

*Hapalia concolor*, *Moore, Lep. Ceylon* iii, p. 339, pl. 181, fig. 3 (1886).

1. Mabek, Jalor. 23rd July, 1901. (At light).

**TINEIDAE**

**Coryptilum**, *Zeller, Isis.*, p. 181 (1839).

**260. Coryptilum klugi**

*Coryptilum klugi*, *Zeller, loc. cit.*; *Walsingham, Swinboe's Cat. Het. Mus. Oxon.* ii, p. 580 (1900).

1. Bukit Besar, Nawngchik. 2,500 feet. 2nd May, 1901.

‘Flying round inflorescence of wild banana; late afternoon.’

2. Jeram Kawan, South Perak. 13th February, 1902.

‘Fairly abundant among undergrowth, especially where there are wild bananas and gingerworts.’

**Monopis**, *Hübner, Verz. Schmett.*, p. 401 (1826).

*Blabophanes*, *Zeller, Linn. Ent.* vi, p. 100 (1852).

**261. Monopis monachella**

*Tinea monachella*, *Hübner, Samml. Eur. Schmett.* viii, pl. 21, fig. 143 (1860).

*Monopis monachella*, *Walsingham, Trans. Ent. Soc. London*, 1897, p. 63.

1. Patani. 8th October, 1901. (At light).

SUPPLEMENTARY LIST OF SPHINGIDAE

BY DR. K. JORDAN, PH.D.

[Before Colonel SWINHOE undertook to describe out Heterocera, the majority of the Sphingidae had been submitted to Dr. K. JORDAN, who has enumerated the following species]:—

**ACHERONTIINAE**

**Acherontia**, *Laspeyres, Jenaische Allg. Lit. Zeit.* iv, p. 99 (1809).

**262. Acherontia lachesis**

*Sphinx lachesis*, *Fabr. Ent. Syst. Suppl.*, p. 434, n. 26-7 (1798).

1 ♀. Bukit Besar, Nawngchik. 2,500 feet. 2nd May, 1901. (At light).

**263. Acherontia styx**, subsp. **crathis**

*Acherontia styx crathis*, *Roths. & Jord. Nov. Zool.* ix, Suppl. p. 23 (1903)  
(Japan to Ceram and Kisser).

1 ♀. Ban Sai Kau, Nawngchik. April, 1901.

‘Both this and the preceding species squeak when disturbed or handled.’

**Meganoton**, *Boisd. Spéc. Gén. Lép. Hét.* i, p. 58 (1875).

**264. Meganoton nyctiphanes**

*Macrosila nyctiphanes*, *Walker*, viii, 209 (1856).

*Meganoton nyctiphanes*, *Roths. & Jord. Nov. Zool.* ix, Suppl. p. 35 (1903).

♂, ♀. Biserat, Jalor. 10th July, 1901.

‘On tree-trunk in village; sunset.’

**SESIINAE**

**Cephonodes**, *Hübner, Verz. Schmett.*, p. 131 (1822).

**265. Cephonodes hylas**, subsp. **hylas**.

Sphinx hylas, *Linn. Mant. Plant.*, p. 539 (1771).

Cephonodes hylas hylas, *Roths. & Jord. Nov. Zool.* ix, Suppl. p. 468 (1903).

1 ♀. Mabek, Jalor. 29th July, 1901.

‘In the State of Selangor the larva of this species has become a serious agricultural pest, and has utterly destroyed several plantations of Liberian coffee.’

**PHILAMPELINAE**

**Panacra**, *Walker*, viii, 154 (1856).

**266. Panacra variolosa**

*Panacra variolosa*, *Walker*, viii, 156 (1856).

*Panacra variolosa*, *Roths. & Jord. Nov. Zool.* ix, Suppl. p. 539 (1903).

♂. Bukit Besar, Nawngchik. 2,500 feet. May, 1901.

**267. Panacra myodon**, subsp. **elegantulus**

*Thyreus elegantulus*, *Herr.-Schäff. Ausseur. Schmett.*, f. 479 (1856).

*Panacra myodon elegantulus*, *Roths. & Jord. Nov. Zool.* ix, Suppl. p. 542 (1903).

♀. Semangko Pass, Selangor-Pahang border. 2,700 feet. May, 1902. (At light).

**CHOEROCAMPINAE**

**Macroglossum**, *Scop. Intr. Hist. Nat.*, p. 414 (1777).

**268. Macroglossum insipida**, subsp. **insipida**

*Macroglossa insipida*, *Butler, P.Z.S.* p. 242 (1875).

*Macroglossum insipida insipida*, *Roths. & Jord. Nov. Zool.* ix, Suppl. p. 642 (1903).

1 ♀. Biserat, Jalor. 16th July, 1901.

‘Common at Biserat, flying rapidly among low shrubs at dusk.’

**Theretra**, *Hübner, Verz. Schmett.*, p. 135 (1822).

**269. Theretra pinastrina**, subsp. **pinastrina**

*Sphinx pinastrina*, *Martyn, Psyche*, t. 29, p. 81 (1797).

*Theretra pinastrina pinastrina*, *Roths. & Jord. Nov. Zool.* ix, Suppl. p. 784 (1903).

1 ♂. Sungkei, South Perak. 10th February, 1902. (At light).

1 ♀. Kuala Lumpur, Selangor. 10th June, 1902.



LAND PLANARIANS

BY  
F. F. LAIDLAW, B.A.



## INTRODUCTORY NOTE

ONLY three examples of this group were preserved by us, and we did not see many more. Indeed, as I have noticed on both my visits to the Patani States, Land Planarians are very scarce in this district in dry weather, and by no means common even during the stormy season, whereas in the interior of Kelantan they are comparatively abundant in a moderately moist environment, such as exists in August and September at Kuala Aring. There is no reason to think that the species are less numerous in the southern half of the Malay Peninsula than they are in Java or Ceylon, but they have been very little collected.

NELSON ANNANDALE



# REPORT ON THE LAND PLANARIANS

By F. F. LAIDLAW, B.A.

DEMONSTRATOR AND LECTURER IN THE OWENS COLLEGE, MANCHESTER.

## BIPALIIDAE

### 1. *Bipalium jalorense*, sp. nov.

One specimen, from the interior of a rotten tree-trunk lying on the ground.

Bukit Besar, borders of Jalor and Nawngchik. 2,500 feet.

Very distinct from any species hitherto recorded from the Peninsula. Unfortunately the only specimen has lost its hinder end, but the characters are sufficiently well marked to admit of a satisfactory diagnosis.

The length of the fragment is about 30 mm., the breadth 5 mm. The breadth of the head is about 8 mm., and that of the 'sole' 1 mm. The margin of the body is bright yellow. The middle of the dorsal surface is occupied by a longitudinal dark band about 3.5 mm. in breadth, which is nearly black laterally, but becomes slightly paler towards the middle line. The under surface has the margin yellow (the whole side of the body being of this colour). This margin is about as deep as on the dorsal surface. Within the margin on either side is a black band about 1 mm. in width, fading on its inner side to yellowish-white. The sole is white.

The margin of the head and its lobes are yellow, thickly studded, especially towards the middle line, with minute eye-spots. The margin is about 1 mm. in breadth, and is succeeded by a well-defined, thick crescentic line of about the same breadth as itself, which commences on the under surface of the body, just behind the angles of the lobes, and is in turn followed by a small semi-circular patch of yellow, which intervenes between the crescentic black line of the head and the median black band of the body.

The eye-spots on the margin of the head are so numerous as to give it a brownish tinge. Those lying along the extreme edge of the margin are decidedly smaller than those lying further back. Eye-spots occur also on the ventral side of the black marks in the angles of the lobes.

## RHYNCHODEMIDAE

2. *Rhynchodemus nematoides*, Loman

Two specimens from the same locality. A common and widely-spread species ; it has also been recorded from Java and Ceylon.

'One of these specimens was taken on a banana leaf growing at the edge of a small jungle clearing ; the other was gliding on the shady side of a tree-trunk in thick jungle. The latter individual moved up to a colony of *Psocidae* (Neuroptera) that, as a whole, closely resembled a foliaceous lichen, wound its body partially round one of the insects, protruded its pharynx over the body of its victim (which, apparently, made no attempt to escape), and commenced to devour it.

'*Rhynchodemus nematoides*, or a species resembling it in its comparatively sober grey coloration and slender shape, became more abundant than any other at Kampong Jalor during the rains in November, gliding in the early morning on the leaves of bushes surrounding the village ; I probably observed about half-a-dozen specimens in the course of a fortnight.'

The following is a list of species known to occur in the Malay Peninsula :—

<i>Pelmatoplana sondaiaca</i> (LOMAN).	Singapore ; Kuala Aring,
<i>Bipalium steindachneri</i> , v. GR.	Malacca. [Kelantan.
„ <i>strubelli</i> , v. GR.	Singapore.
„ <i>rauchi</i> , v. GR.	„
„ <i>ridleyi</i> , v. GR.	„
„ <i>phoebe</i> (?) var. <i>transversifasciatum</i> , <sup>1</sup> MÜLLER.	Kuala Aring, Kelantan.
„ <i>megacephalum</i> , <sup>2</sup> MÜLLER.	Gunong Inas, Perak.
„ <i>jalorense</i> , sp. nov.	Bukit Besar, borders of Nawng-chik and Jalor.
<i>Placocephalus javanus</i> (LOMAN).	Singapore.
„ <i>gracilis</i> (LOMAN).	„
„ <i>bergendali</i> , v. GR.	Perak ; Kuala Aring, Kelantan.
<i>Rhynchodemus vejovskyi</i> , v. GR.	Singapore.
„ <i>nematoides</i> (LOMAN).	Bukit Besar, borders of Nawng-chik and Jalor.

1, 2. Müller, in an interesting account of these species, has given the localities in inverted order, doubtless owing to a displacement of the labels. The specimens described by him were collected by myself at the localities given above (Müller in *Zeitschr. f. wiss. Zool.* LXXIII, pp. 81-85, Taf. IV, figs. 4, 4A, 5, 5A).

DIPTERA PUIPIPARA

VON DR. P. SPEISER, BISCHOFSBURG, OSTPREUSSEN



## INTRODUCTORY NOTE

THE six species of parasitic Diptera in our collection were all obtained in the Patani States by Mr. ROBINSON and myself, and Dr. SPEISER tells me that they are the first recorded from the Malay Peninsula. From a morphological standpoint, the chief interest of the collection lies in the inclusion of a species of the anomalous genus *Ascodipteron*, on the anatomy of which we hope that the same author will furnish us a paper later. From a purely bionomical point of view, the specimens of the other species enumerated and described would seem to indicate a difference of habits between the *Nycteribiidae* and the *Streblidae*, for the two species representing the former family were taken in different localities, each on a specific host; while each of the two species of *Streblidae* was taken on two different hosts not even belonging to the same genus. *Pteropus vampyrus* and *Scotophilus castaneus*, however, are both bats which sleep during the day apart from other species, in trees, or in the roofs of houses in the case of the latter; but the bats on which we took specimens of the *Streblidae* probably lived in caves, together with an enormous number of other individuals belonging to a great variety of species; and even the wingless *Diptera pupipara*, with the exception of such forms as *Ascodipteron*, are sufficiently active to make their way from one host to another. It is interesting also to notice that the Dipterous parasite of *Pteropus vampyrus* is almost as much larger than that of any other bat which we saw, as *Pteropus* itself is than any other Cheiropterous host; *Ascodipteron* must again be excepted, but when parasitism has produced such extreme changes as it appears to have done in this animal, we must always look for increase of bulk.

NELSON ANNANDALE



## REPORT ON THE DIPTERA PUPIPARA

VON DR. P. SPEISER, BISCHOFSBURG, OSTPREUSSEN

**D**URCH gütige Vermittelung des Herrn P. H. GRIMSHAW in Edinburgh, wurde ich in die angenehme Lage versetzt, mehrere Gläschen mit Parasiten aus der Gruppe der Diptera Pupipara untersuchen zu können, welche die Herren NELSON ANNANDALE und HERBERT C. ROBINSON auf einer Reise durch die Halbinsel Malakka nebst anderen Dipteren gesammelt haben. Es findet sich dar unter einiges recht interessante, so dass ich über die Ergebnisse dieser Untersuchung hier eigens berichten möchte. Ein einziges der mir zugestellten Gläschen enthält keinen Parasiten einer Fledermaus, und dieses Stück sei daher hier vor den andern behandelt, zumal es eine bisher unbeschriebene Art der Gattung *Lipoptena* Nitzsch repräsentiert.

### I. LILOPTENA

#### 1. *Lipoptena gracilis*, sp. nov.

1 einziges ♀, am 29. x. 1901 bei Jalor, im siamesischen Teil der Halbinsel, als Parasit des *Tragulus affinis*, G. R. Gray, gefangen.

Die Art steht in der Grösse unter den wenigen bekannten *Lipoptena*-Arten am nächsten der *L. pteropi* Denny<sup>1</sup> sowie der *L. capreoli* Rond.<sup>2</sup> und *L. capensis* WALK. (als *Ornithobia* nach einem ♂ beschreiben<sup>3</sup>), welche letztere jedoch der abweichenden Färbung wegen nicht in Betracht kommt. Von den beiden andern genannten Species unterscheidet sie sich jedoch auch leicht durch eine eigentümlich zierliche Beborstung des Abdomens, die weiter unten genauer beschrieben werden soll. Die noch etwas problematische *L. capreoli* Rond. von Cypern gehört ausserdem zu den Arten mit besonders schmalen Augen, was für unsere Art nicht zutrifft. Von *L. pteropi* Denny endlich ist sie leicht und noch dadurch unterschieden, dass von einem dunklen braunen Punkte am Ende der Schenkel bei ihr nichts zu sehen ist.

Länge 2·5 mm., Mundrand bis Hinterrand des Scutellum knapp 1 mm.

1. *Ann. Mag. Nat. Hist.* 1843, v. 12, p. 315, t. 17, f. 5.

2. *Bull. Soc. ent. Ital.* 1879, v. 11, p. 14.

3. *List of the Diptera in the British Museum*, 1849, v. 4, p. 1142.

Kopf kurz und breit, mit breiten, fast etwas hervorquellenden Augen. Die Augenränder etwas schmaler als die Augen, das matte Mittelfeld der Stirn etwa parallel begrenzend. Clypeus schwarz mit gelber medianer Einkerbung im Vorderrande, der übrige Kopf rostgelb, nur auf dem Stirndreieck noch ein schwarzer Fleck zwischen den Ocellen. Kopf ohne Borsten mit Ausnahme je einer jederseits vom Hinterrand des Stirndreiecks. Antennen knopfförmig, Maxillarpalpen kurz, kaum ein Drittel so lang als der Clypeus.

Thorax, wenn man von den Schulterecken absieht, so lang als breit; rostgelb mit je einer helleren Strieme jederseits von der Mittellinie. Quernaht des Mesonotum weit nach hinten gerückt. Schulterecken dick kegelförmig, ein Drittel so lang als der übrige Thorax; mit 3-4 mittelstarken Borsten. Auf dem Praescutum mesonoti auf jeder der durch die sehr deutliche Längsnaht geteilten Hälften vorne mit einer etwas grossen und 2-3 kleineren Borsten, vor dem Hinterrande jederseits von der Mittellinie eine ganz winzige, nahe der Dorsopleuralnaht je eine starke und davor eine ganz kleine Borste. Auf dem schmalen Scutum mesonoti vor dem Scutellum eine Reihe von vier langen und starken Borsten in gleichen Abständen. Scutellum kahl bis auf vier Borsten in der Mitte des Hinterrandes, deren mittleres Paar lang, das dünnere kurz ist. Auf den Pleuren vor der Flügelwurzel je 4-5 mittellange Borsten.

Auf der Ventralfläche des Thorax ist das aus zwei seitlichen lappen bestehende, hinten geradlinig begrenzte Prosternum deutlich, das Mesosternum ist doppelt so lang als das hinten spitzbogig ausgebuchtete Metasternum. Die Grenze zwischen den beiden letzteren steht auf der Mittellinie senkrecht. Die ganze Ventralfläche ist gleichmässig kurz beborstet.

Beine von gewöhnlicher Form und Längenverhältnissen der einzelnen Glieder zu einander, nur die Vorderschenkel sind etwas spindelförmig aufgetrieben, ohne bemerkenswerte Beborstungsverhältnisse. Von den Flügeln sind, wie stets in der Gattung *Lipoptena*, nur kurze, lappenartige Fetzen mit unregelmässig zerrissenem Hinterrande und deutlichem Geäder erhalten.

Abdomen dorsal mit 5 oder 6 deutlich abgrenzbaren Segmenten. An der Basis liegt ein grosses Segment, das in der Mitte seines Hinterrandes tief und fast bis zur Basis eingebuchtet ist, und die Seiten des Abdomens ganz in derselben Form umfasst, wie die weichen Elytra der *Meloë* (ein Vergleich, den schon WIEDERMANN für seine als *Melophaga* beschriebene<sup>1</sup> *Lipoptena moschi* anwandte.) Es ist rostgelb gefärbt, und an der Basis liegt jederseits eine halb-kreisförmige etwas dunklere Platte, welche nur am Hinterrande beborstet ist. Ich weiss nicht, ob nicht vielleicht dieses Plattenpaar das eigentliche erste Segment bedeutet. Das grosse mantelförmige Segment trägt ziemlich

1. *Aussereuropäische zweiflügelige Insekten*, Hamm., 1830, v. 2, p. 613.

lange Borsten auf der ganzen Fläche, und eine Reihe solcher begleitet den Hinterrand, sodass sich etwas vor der Mitte des Abdomens eine zierliche, winklig gebrochene Borstenreihe findet. Hinter diesem Segmentrand folgt eine weissgelbe gänzlich borstenfreie Fläche, in welcher, schon am Hinterrande des Abdomens, jederseits ein Stigma liegt. Am Hinterrande zusammengedrängt und hier einen trapezoidalen deutlich abgegrenzten Bezirk von etwas mehr als dem vierten Teil der Länge des Abdomens einnehmend, liegen dann die für *Liptoptena* charakteristischen drei queren Segmentplatten. Sie sind schmal, fast 6 mal so lang als breit ('breit' hier aber in der Medianlinie gedacht-lang darauf senkrecht). Die beiden ersten tragen nur ein Paar ganz winzige Börstchen vor dem Hinterrande, die hinterste jederseits drei starke. Ebensoviel Borsten stehen auch auf warzenähnlichen Erhebungen jederseits vor der Analöffnung. Ventral ist ausser einer gerade begrenzten derberen Basalsegmentplatte, die an den Seiten des Hinterrandes je 3-4 längere Borsten hat, ein mediales, nicht segmentiertes Drittel von zwei seitlichen zu unterscheiden, in welchen sich die Segmentgrenzen des grossen mantelförmigen und des darauf folgenden weichen deutlich erkennen lassen. Vor der Genitalöffnung liegt nur eine nicht charakteristisch configurierte, wenig dunklere Platte.

## II. STREBLIDAE

### 2. *Nycteribosca amboinensis*, Rond.

4 Exemplare, Anfang, August, 1901, bei Biserat, Jalor, auf *Rhinolophus malayanus*, Bonhote, und *Hipposiderus larvatus* (Horsf.).

### 3. *Raymondia pagodarum*, Speiser<sup>1</sup>

2 Exemplare daselbst, auf *Rhinolophus malayanus*, Bonhote, und *Hipposiderus larvatus* (Horsf.).

Wie ich schon vermutete, ist das eine der beiden Merkmale, durch welche ich diese Art von der nächst verwandten *R. huberi* Frfld. abgrenzte, anscheinend durch zusammentrocknen der betreffenden Exemplare vorgetäuscht worden. Bei diesen malayischen Exemplaren ist das Scutum mesonoti auch nicht nur  $\frac{1}{3}$ , sondern  $\frac{1}{2}$ , so lang wie das Praescutum; dagegen besteht das Merkmal des Flügelgeäders völlig zu Recht. Beide Exemplare stimmen im Geäder genau mit meiner Abbildung überein (*l.c.* p. 49, fig. 7).

## III. NYCTERIBIIDAE

### 4. *Nycteribia (Aerocholidia) chlamydophora*, sp. nov.

2 ♂, 8 ♀ auf *Scotophilus castaneus* (Horsf.), bei Biserat bei Jalor am 27th June, 1901; 1 ♂, 1 ♀ auf derselben Fledermausart am Bukit Besar in 2,500 Fuss (760 m.) Meereshöhe.

1. Archiv. f. Naturgeschichte, Jahrgg. 1900, p. 50.

Die Art reiht sich in meiner Bestimmungstabelle der Nycteribien<sup>1</sup> unter 8 neben *N. (A) dispar*, mihi von Neu Guinea ein, an deren ♀ sie durch das stark entwickelte Basalsegment des ♀ Abdomens erinnert.

Sie ist 2-2, 5 mm. lang, gleichmässig braungelb gefärbt.

Kopf von ganz gewöhnlicher Form, eine Gruppe Borsten vorne am Scheitel, die Wangenränder spärlich beborstet, und je zwei kleine Borsten jederseits etwas unter der Stelle, wo sonst die Augen liegen. Thorax dorsal ohne irgendwelche Besonderheiten, auf den den Mesopleuralnähten entsprechenden Leisten (*l.c.* p. 18-19) steht eine gebogene Reihe von 10-12 schwachen Börstchen. Das Ctenidium hat keine auffallend dünnen Zähne. Ventral ist der Thorax länger als breit, der Hinterrand nur ein wenig in der Mitte eingebuchtet, die Längsnaht hinten grubig vertieft.

Abdomen des ♀ : dorsal wie ventral werden die vorderen 2 Drittel eingenommen durch ein sehr langes Basalsegment von charakteristischer Configuration. Die dorsale Fläche ist ganz glatt, nur sehr spärlich beborstet, in der Mitte durch eine hellere, nach hinten breiter werdende Linie gewissermassen in zwei Hälften gespalten, deren jede hinten medial mit einem dunkeln spitzen mit langen dunkeln Borsten besetzten Zipfel endet. Bei einem Exemplar fehlt diese Spaltung, sodass die Hinterrand als ganzrandig, aber in der Mitte breit zipfelig vorgezogen beschrieben werden muss. Die drei folgenden Segmente sind durch je zwei seitliche Gruppen von Borsten, markiert, auf den zweitfolgenden stehen mitten inne noch 2 Borsten. Ventral hat das Basalsegment eine dunkle Mittellinie, ist gleichmässig behaart und trägt am ganz geraden Hinterrande ein sehr dichtes Ctenidium von etwa 34-42 Zähnen, welches nur die mittleren 2 Drittel einnimmt und nach aussen noch durch je einige Borsten fortgesetzt wird. Das folgende Segment ist nur an den Seiten etwas dunkler braun, der Hinterrand durch eine spärliche in der Mitte unterbrochene Borstenreihe markiert, etwas eingebuchtet. Das dritte besteht aus zwei dreieckigen seitlichen dunkleren Stücken, welche am Hinterrande beborstet sind. Dann folgt eine braune, hoch bogenförmig nach vorn geschwungene dünne Chitinleiste, auf der nur 4-5 Paar ganz schwache Borsten stehen, endlich die braune, breite, durch einen hellen Längsstreifen geteilte Platte vor der Genitalöffnung, welche den erwähnten Bogen ausfüllt, nur ganz vorn 2 Paare und am Hinterrande einige schwache Börstchen trägt.

Abdomen des ♂ : dorsal sind alle Segmente mit Ausnahme des ersten mit einigen wenigen Börstchen besetzten auf der Fläche ganz unborstet. Die

1. Arch. Naturg., v. 67, 1901, p. 68. Gerade an dieser Stelle muss die Tabelle wesentlich umgeändert werden, indem *N. minuta* Wulp und *N. roylei* Westw. an durchaus anderer Stelle einzureihen sind. Das Genauere will ich an anderer Stelle bringen.

Borsten am Hinterrande sind am ersten Segment gleichmässig lang, je weiter nach hinten, desto länger werden die mehr seitlich stehenden Borsten, bis am Hinterrande des fünften wieder nur kurze und spärliche Borsten zu finden sind. Die drei ersten Segmente sind gleich lang, das 4te und 5te unter sich gleich, etwa  $\frac{2}{3}$  der einzelnen vorherigen, das Analsegment ziemlich kurz und stumpf. Ventral sind die Segmente 1, 2, 3, 4 + 5 unter sich gleich lang, 1-3 auf der Fläche beborstet, 1 mit dem Ctenidium, 2 und 3 am Rande spärlich mit schwachen kurzen Borsten besetzt, 4 + 5 an der Seite des Hinterrandes mit ziemlich langen Borsten, in der Mitte zwischen kürzeren Borsten mit 4 Paaren kurzer starker, schwarzbrauner Dornen. Die Haltzangen gerade, schmal und ziemlich lang, an den Hinterrand des vorletzten Segmentes nicht heran reichend, braun, am Ende schwarzbraun bis schwarz.

#### 5. *Cyclopodia horsfieldi*, de Meijere<sup>1</sup>

Bei Patani 1 ♂ auf *Pteropus vampyrus* (Linn.), bei Biserat bei Jalor 6 ♂, 3 ♀ auf *Pteropus vampyrus* (Linn.) und 1 ♂, 1 ♀ auf *Pteropus vampyrus* (Linn.).

### IV. ASCODIPTERON

#### 6. *Ascodipteron siamense*, sp. nov.

Mr. ANNANDALE hat dank seiner Aufmerksamkeit das Glück gehabt, auf einer Fledermaus (*Hipposiderus bicolor* Temm.) von Biserat bei Jalor einen Parasiten aus dieser Familie zu entdecken, von der bisher nur 3 Exemplare bekannt geworden sind. Das Exemplar ist zusammen mit dem umgebenden Gewebe für anatomische Untersuchung conserviert, die ich hier leider wegen Mangel an Hilfsmitteln nicht vornehmen kann. Ich bin daher auf die zu Tage liegende Endplatte des Abdomens angewiesen für einen Vergleich mit den beschriebenen Species. Der geographischen Lage des Fundorts nach kommt wohl nur *Ascodipteron phyllorhinae*, Adensamer<sup>2</sup>, aus Java in Betracht, diejenige Art, durch welche wir mit der so höchst eigentümlichen Gattung zuerst bekannt wurden. Von ihr unterscheidet sich das vorliegende Stück in der Stellung der Stigmen auf der Endplatte. Die vier grossen, dorsal von der 'Terminalspalte' (Genitalöffnung) gelegenen Figuren stehen nämlich in einer annähernd horizontalen Reihe, die beiden ventral gelegenen etwas dichter an der Spalte, als Adensamer zeichnet (*l.c.*, tab. I, fig. 6), letztere etwa so wie sie bei *A. lophotes* Monticelli<sup>3</sup> stehen. Ob die beiden kleineren 'Chitinringe,' welche zwischen 'Terminalfurche' und 'Terminalspalte' auch bei dem jetzt gefundenen Stück ganz

1. *Tijdschr. Ent.*, 42 Deel, 1899, p. 153.

2. *S. B. Ak. Wien, Math.-nat. bl.*, Bd. 105, I Abt. p. 400 ff.

3. *Ricerche fatte nel Labor. Anat. normale d. R. Univ. Roma ed in altri. Labor. biol.* Vol. VI, fasc. 4, 1898, pp. 201-230, tav. IX.

ebenso wie bei Adensamers vorhanden sind, auch Stigmen sind, und die Terminalfurche thatsächlich die Analöffnung ist, wie Monticelli annimmt, kann ich leider nicht entscheiden. Da man wohl vielfach nur auf die Untersuchung des freiliegenden Knopfes angewiesen sein wird und dieser ein bei allen drei Funden verschiedenes Bild bietet, möchte ich ihn zur specifischen Trennung verwerten und dabei dem von Messrs. ANNANDALE und ROBINSON gefundenen Stück zugleich auch einen Namen geben. Die drei Arten lassen sich dann folgendermassen scheiden :

A.—Von den 4 grossen dorsalen Stigmen steht das mediale Paar dorsal vom lateralen. *A. lophotes* Monticelli.

B.—Von diesen 4 Stigmen steht das mediale Paar nicht dorsal vom lateralen.

(1) Die 4 stigmen liegen fast in einer horizontalen Reihe.

*A. siamense* sp. nov.

(2) Das mediale Paar liegt weit ventral vom lateralen.

*A. phyllorbinæ* Adensamer.

## APPENDIX

Dr. SPEISER informs us that no pupiparous Diptera have hitherto been recorded from the Malay Peninsula, but enumerates the following species from neighbouring countries. We hope that he may give an account of the anatomy of *Ascodipteron siamense* in a subsequent paper.

From BENGAL :—

### Hippoboscidae

*Hippobosca maculata*, LEACH (1818) (= *aegyptiaca* var *bengalensis*, ORMEROD).

### Nycteribiidae

*Cyclopodia hopei*, WESTW. (♂) (1839).

From BURMA :—

### Hippoboscidae

*Hippobosca longipennis*, FABR. (1805) (exact description prepared by SPEISER).

*Ornithoctona nigricans*, LEACH (1818).

*Ornithoza andaiensis*, ROND. (1878).

### Streblidae

*Nycteribosca gigantea*, SPEISER (1900).

*Nycteribosca amboinensis*, ROND. (1878).

### Nycteribiidae

*Penicillidia euxesta*, SPEISER (1901).

*Eucampsipoda hyrtli*, KOL. (1856).

*Cyclopodia ferrarii*, ROND. (1878).

REPORT ON THE BATRACHIANS AND  
REPTILES

By G. A. BOULENGER, F.R.S.



## INTRODUCTORY NOTE

THE Batrachians collected by Mr. ROBINSON and myself, on which, with the Reptiles, Mr. BOULENGER has been kind enough to furnish a report, were obtained in the Patani States, a few of the commoner species being also represented by duplicates from Perak or Selangor. The Reptiles are mostly from the same district, but some interesting forms were obtained in Selangor by Mr. ROBINSON, and the type of a new species of *Testudo* and several snakes and lizards were collected by us together in South Perak. In preparing the notes I have added to Mr. BOULENGER's report, I have used Mr. ROBINSON's observations as well as my own, some of the latter having been made as long ago as 1899; and the descriptions of the colour of the living animals were mostly our joint work. From a bionomical standpoint, two interesting features in the collection are the evidence it affords (1) of the superior conspicuousness of coloration possessed by *young* individuals of certain species of Reptiles, and (2) of the mimicry of the deadly *Naia bungarus* by a non-venomous snake.

It should be noted that while the 'Skeat' collection of Reptiles from the Patani States, which was made by myself, was peculiarly rich in snakes, our attempt in the present one was to obtain as representative a series of the lizards of the district as possible, so that the two collections supplement one another in a very interesting way.

NELSON ANNANDALE



## REPORT ON THE BATRACHIANS AND REPTILES

BY G. A. BOULENGER, F.R.S.

THE collection made by Messrs. ANNANDALE and ROBINSON, and kindly entrusted to me for study, affords a substantial supplement to our knowledge of the herpetology of the Malay Peninsula, recently enriched by the efforts of Messrs. S. FLOWER, A. L. BUTLER, and L. WRAY, and by the 'Skeat' Expedition, in which Mr. ANNANDALE himself took part, and the results of which have been reported upon by Mr. LAIDLAW. The present report contains descriptions of two new frogs, two new tortoises, a new lizard, and a new snake; whilst three lizards (*Mabuia siamensis*, *Lygosoma quadrivittatum*, *Dibamus novae-guineae*) and one snake (*Ancistrodon rhodostoma*) are recorded for the first time from the Malay Peninsula.

### BATRACHIA

#### ECAUDATA

#### PELOBATIDAE

##### 1. *Megalophrys montana*, Kuhl

(Plate V, Fig. 1.)

A young specimen, 26 mm. from snout to vent, and numerous larvae from Bukit Besar (2,500 feet). A half-grown male from Jalor.

The curious larvae, with their enormous funnel-shaped lips, were first described and figured by Professor MAX WEBER,<sup>1</sup> and further specimens from Bukit Besar, obtained by the 'Skeat' Expedition, and identified by me, have been noticed by Mr. LAIDLAW,<sup>2</sup> and figured by Dr. GADOW, in the Reptile volume of the *Cambridge Natural History*, p. 60.

1. *Ann. Jard. Bot. Buitenzorg*, xv, Suppl. ii, 1898, p. 5.

2. *Proc. Zool. Soc.* 1900, p. 889.

The superciliary 'horns' are merely indicated in the half-grown specimen and in a young perfect specimen, and no trace of them is to be seen in one, only half as long, which has retained the tail fully developed. The tympanum is distinct. Until more specimens have been examined, it is, in my opinion, safer to designate this frog by the varietal name *aceras* than to describe it as a new species.

'The adult appears to be nocturnal, and all the specimens that I have seen under natural conditions have been taken in dead tree-trunks lying on the jungle floor. The larvae were obtained from a pool, not more than a foot-and-a-half square, in a little watercourse of partially artificial origin. I took a number of specimens in the same pool at the beginning of May, in 1899. They occupy the extreme edge, where the water is so shallow that their tails almost touch the bottom when they are suspended from the surface film; and when the pool dries up, as it does in comparatively dry weather, they conceal themselves among the mud and dead leaves that remain, living, at any rate for some days, under such conditions. Nevertheless, we were unable to keep them alive in captivity for more than a day or two, probably because we did not put them in sufficiently shallow water. Their food, judging from the contents of their intestines, consists of algae and minute organisms, both animal and vegetable. I do not believe that it is possible for them to rasp the leaves of water-plants, as Dr. GADOW suggests. As a rule, they hang from the surface film, as in Dr. GADOW's figure, but occasionally they sink to the bottom, where they often lie on one side for a few minutes before returning to the surface. The moment that they commence to sink, the funnel round the mouth collapses, taking on the form of a pair of horns, curling backwards along the side of the head; but, as they touch the surface again, it re-expands into a regular parachute form: I was able to obtain photographs illustrating this action. It is probable that development is liable to be protracted by drought, as we found specimens in the same pool both at the end of April and again in September and October, and those taken in the autumn were, with a few exceptions, only a very little further advanced than those taken in spring, an unusually dry summer having intervened. It is, however, possible that they may have belonged to different broods, and I am only led to make the suggestion that this was not so, by the fact that on one occasion, even in September, when the rains should be commencing, the pool dried up almost completely, and the tadpoles took refuge in the mud. The funnel round the mouth exhibits some curious histological features, which will, I hope, be described in a subsequent paper.'

**BUFONIDAE****2. Bufo asper**, Gravenh.

Bukit Besar, 2,500 feet, and Sungkei, Batang Padang, South Perak.

'A common species, both in Perak and in the Siamese States. It is generally found near human dwellings or in secondary jungle, but occasionally penetrates into thick forest country.'

**3. Bufo parvus**, Blgr.

Sungkei, South Perak.

**4. Bufo melanostictus**, Gthr.

Jalor and Selangor.

'Probably the commonest terrestrial Batrachian in most parts of the Peninsula, but I have never seen it in thick jungle. In the town of Senggora it issues forth from holes in the city wall every evening, or after a shower, in enormous numbers.'

**ENGYSTOMATIDAE****5. Callula pulchra**, Gray

Jalor and Selangor.

'Common in the Patani States and Senggora, apparently less so on the west side of the main range. It is chiefly nocturnal in its habits, often hiding during the day among the cocoanut-husks and other refuse under native houses. I have seen a specimen seated in the hollow of a dead branch, surrounded by what appeared to be the remains of an ants' nest; but all the ants were dead, whether killed by contact with the Batrachian or not, I cannot say, though it seems probable that this may have been the case. I have noted elsewhere,<sup>1</sup> how the way in which this toad inflates itself on being disturbed causes its conspicuous coloration to be displayed.'

**6. Microhyla ornata**, D. & B.

Mabek, Jalor.

'Not uncommon in the long grass of clearings surrounded by jungle.'

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1. *Proc. Zool. Soc.* 1900, p. 857.

## RANIDAE

### 7. *Oxyglossus lima*, Gravenh.

Cape Patani.

‘Common in the freshwater pools among the sandy Casuarina woods on Cape Patani ; appears to be largely an aquatic species. Local in distribution.’

### 8. *Rana macrodon*, D. & B.

Bukit Besar, 2,500 feet ; and Telôm, Perak-Pahang boundary, 4,000 feet (young specimen).

‘Both specimens were taken hiding under stones at the edge of jungle streams.’

### 9. *Rana tigrina*, Daud.

Jambu, Jhering.

‘The specimen was taken on the mud of the brackish mangrove swamp at the mouth of the Jambu River. In such environment it is not uncommon, occupying holes exactly similar to those of the mangrove crabs. I have seen a specimen dive into a strongly saline pool and remain under the surface for some minutes. It is also abundant, judging from its characteristic croaking, in the swamps of the Taleh Sap at Lampam, in Patalung, these swamps being possibly brackish at certain seasons of the year.’

### 10. *Rana limnocharis*, Boie

Jalor.

‘The common rice-field frog, both of the Patani and the Federated Malay States. In dry weather it is occasionally found in the jungle, and it is generally common on elephant tracks in all places where the ground is sufficiently soft to retain impressions wherein water may collect. Puddles thus formed are a favourite spawning-place, but the eggs are also frequently laid in ditches and pools. They form a feebly coherent, one-layered mass of no great size that floats on the surface of the water, which oftens becomes quite hot under the mid-day sun. The ova appear to have about half the diameter of those of *R. temporaria*, and to hatch within a week. In Jalor, spawning takes place throughout the summer months, but most frequently in June or July, apparently reoccurring after every heavy fall of rain. *R. limnocharis* sits in great numbers along the edges of the embankments of flooded rice fields, and when a person or large animal approaches, leaps hurriedly, with a splash, into the water. It swims away for a yard or two, and then returns

abruptly to the embankment, only a few feet in front of its former station. So rapidly is this manoeuvre executed, that the frog is often re-established on dry land before the cause of its disturbance comes on a level with it, in which case it again leaps off and acts as before. At night and during breeding times in summer, the rice-field frogs (in Malay *berkatak bendang*) are very noisy, their croaking somewhat resembling the syllables 'gông-gông, gông-gông,' repeatedly and monotonously reiterated. In Jalor, Malay children imitate it very accurately by means of an ingenious toy. They take a narrow strip of rattan or other flexible but fairly stiff material, and split it for about half its length; on each section they fasten a large *Ampullaria* shell, and then draw a stick rapidly backwards and forwards between the two shells.

'In a number of specimens of *R. limnocharis*, taken from the same field and on the same day, the colour variation is considerable, some being devoid of a pale mid-dorsal line, which in some is white, in some green, in some pink, and in some tinged with yellow; while, occasionally, the whole of the dorsal surface, which is usually of a dull mottled-grey, is suffused with bright green. This frog forms a very important item in the diet of several reptiles and of the numerous wading birds that collect in the rice fields during the rains of autumn and winter.'

#### 11. *Rana erythraea*, Schlg.

Mabek, Jalor.

'I do not remember having seen this frog either in the coast lands of the Patani States, in the rice fields of Jalor and Nawngchik, or in the comparatively dry jungle on the limestone hills of the former state; but it is not uncommon at Mabek, sitting on bushes at the edge of the stream, into which it leaps as soon as any disturbance occurs in its vicinity. Several may sometimes be seen on one bush. Near Kuala Lumpur, as Mr. ROBINSON has pointed out to me, it is common in the rice fields.'

#### 12. *Rhacophorus leucomystax*, Gravenh.

Kampong Bayu and Biserat, Jalor.

'This species is fairly common in the neighbourhood of human dwellings, both in the Patani States and other parts of the Peninsula, though being largely nocturnal, it is not very often seen. Its spawn is never, so far as I am aware, deposited in the water, but is either suspended from the leaves of trees, the eaves of houses, or some other point projecting over water or damp soil, or else is laid on the edge of buffalo-wallows or the embankments of

rice fields. The larvae appear to be able to develop considerably, at any rate to assume an elongate form, before the froth, in which they are enveloped, comes in contact with water ; but if the direct rays of the sun fall upon them, as is often the case, and if they are not washed into some pool or puddle within a week or so, they perish. The frog is by no means sagacious in placing its spawn.<sup>1</sup>

*Rhacophorus leucomystax* has greater powers of colour change than any other frog with which we met, the changes being due partly to changes in the surroundings, or perhaps rather to variations in the intensity of reflected light, and partly to its own emotions. A specimen sitting among green leaves in the open is usually of a yellowish-green shade, while one confined in a comparatively dull environment becomes darker ; but sluggish specimens, which may be diseased, are generally dark ; and if a green specimen is handled, it also becomes dark, the bars on its hind legs being very conspicuous. We saw one specimen, which, seated on a withered banana leaf and surrounded with other withered trunks and foliage, had assumed the dull grey of such surroundings exactly ; even the iris, which is habitually yellow or brown, having become of this colour. This was at mid-day, in fairly bright light, but the individual appeared to be unusually comatose.'

**13. *Rhacophorus robinsonii*, sp. nov.**

(Pl. V, Fig. 2).

Vomerine teeth in two strong and oblique series touching the inner front edge of the choanae. Snout narrow, as long as the diameter of the orbit ; loreal region nearly vertical, slightly concave ; nostril a little nearer the end of the snout than the eye ; interorbital space a little broader than the upper eyelid ; tympanum very distinct, two-thirds the diameter of the eye. Fingers rather short, much depressed, entirely webbed, the disks as large as the tympanum ; toes webbed to the disks, which are a little smaller than those of the fingers ; subarticular tubercles small but very prominent ; a very small inner metatarsal tubercle ; no tarsal fold. Tibio-tarsal articulation reaching between the eye and the tip of the snout. Skin smooth, granulate on the belly and under the thighs ; no dermal flaps at the heels or above the vent ; a strong fold above the temple. Pinkish-brown above, bluish-grey on the sides of the body and limbs ; sides of head darker purplish-grey, which above is sharply defined on the canthus rostralis ; ill-defined dark spots on the back ; limbs with greyish-brown cross-bars ; interdigital webs blackish, with light veins ; whitish beneath, throat mottled, belly marbled with grey. From snout to vent, 73 mm.

1. Cf. Gadow's *Amphibia and Reptiles*, p. 247.



1.



3.



2 a



2.



4.



J Green del et lith

Mintern Bros imp.

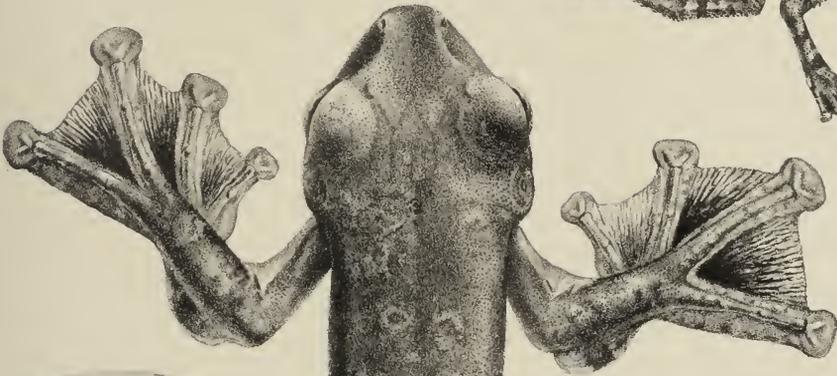
1. MEGALOPHRYS MONTANA, VAR. ACERAS. 2. RHACOPHORUS ROBINSONII.

3. 4. IXALUS LARUTENSIS.

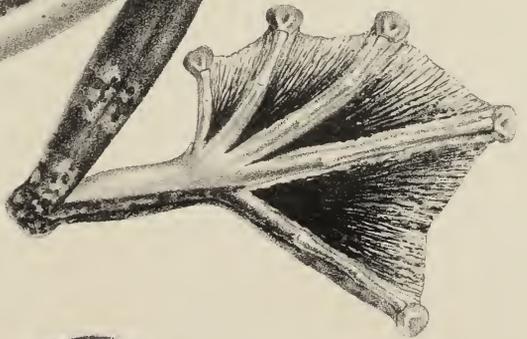
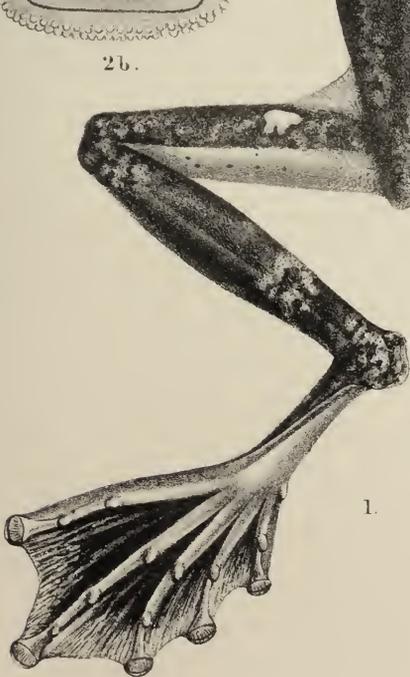




2.



2b.



1.



2a.



This fine new *Rhacophorus* is very near *R. fasciatus*, BLGR., from Sarawak. It differs in the more rounded snout, the more anterior nostril, a larger tympanum, and strikingly in colouration. *R. shelfordi*, BLGR., also from Sarawak, which agrees very closely in most respects with this species and with *R. fasciatus*, is distinguished by having the disks of the fingers considerably smaller than the tympanum.

A single specimen, from Bukit Besar. 2,500 feet.

‘The specimen was taken in the morning, seated, a foot or two above the ground, on the leaf of a herbaceous plant growing in thick jungle. It was very sluggish, making no attempt to escape, though considerable disturbance had been caused by our passage in its immediate neighbourhood. The fore-legs were folded beneath the chest, and the hind legs were pressed close to the sides of the body, beneath which the feet were partially concealed; the snout was somewhat depressed. The colour of the whole of the dorsal surface was a pale coffee, which so closely resembled the shade assumed by many dying leaves that the frog, with its leaf-like outline in the attitude described, was, at first sight, mistaken for a leaf that had fallen from the trees above and had accidentally lodged on the plant; Mr. ROBINSON, a Malay who accompanied us, and I were all completely deceived. At this time the purplish-grey of the side of the head was black, and extended in a well-defined band down each side. When the specimen was handled, its colour became darker, and mottlings of an ill-defined character, as well as the cross-bars on the limbs, made their appearance, as they so often do in species of *Rhacophorus*. The specimen permitted itself to be captured almost without a struggle, after waiting while a camera was fetched and a photograph taken.

#### 14. *Rhacophorus nigropalmatus*, Blgr.

(Pl. VI, Fig. 1).

This handsome frog, probably the very species alluded to by WALLACE<sup>1</sup> as the ‘flying frog,’ was first described from Sarawak. It has since been rediscovered in Sumatra<sup>2</sup> and in Upper Perak.<sup>3</sup>

A female specimen was obtained at Mabek, Jalor, on the 22nd July, 1901. Its colour in life was as follows:—‘Dorsal surface pale grass green, powdered with white; a conspicuous white mark on the dorsal surface of the thigh; on the dorsal surface of the feet, the green changes gradually into orange; membrane of the feet, orange marked with black; sides of the body

1. *Malay Archipelago* I, p. 60.

2. F. Werner, *Zool. Jahrb. Syst.* XIII, 1900, p. 496.

3. S. Flower, *Proc. Zool. Soc.* 1899, p. 899.

orange, changing into deep salmon pink on the abdomen and under surface of digits ; throat and chest cream-colour.'

The specimen, a female, measures 88 mm. from snout to vent. The largest specimen, from Bidi, Sarawak, in the British Museum, measures 100 mm.

The male is still unknown.

' Mr. ROBINSON, who took the specimen, notes that it dropped almost vertically from a tall tree growing at the edge of a large clearing in the jungle, while the individual obtained by Mr. L. WRAY, in Upper Perak, was sitting on a tree-trunk.<sup>1</sup> Beyond the statement of the Chinamen who procured WALLACE his specimen, there appears to be no evidence to prove that the "flying frog" does use its enormous feet to support it in the air, and, so far as we could see, it did not appear likely, from the condition of the web in the living animal, that their purpose was that assigned to them by the discoverer of the species. The seemingly gorgeous coloration may very possibly be protective in its proper surroundings, for, with the exception of the black and orange on the feet, the colours are not arranged so as to contrast with one another, and, as I have pointed out elsewhere,<sup>2</sup> the most brilliant colours, provided only their arrangement be correct, may serve for concealment under conditions of light common in the Malay jungle. In the plate, our specimen of *R. nigropalmatus* is represented as it now is, for the marblings on its dorsal surface only became apparent after it was plunged into spirit. It is interesting to notice that markings of a similar character appear on the bodies of all the three species of *Rhacophorus* taken, if they are roughly treated, and probably also if they are in bad health. These markings are not conspicuous enough to be instances of warning coloration, but are rather analogous to the blushing or paling of a human being under the influence of emotion or in pathological conditions.

' Within the limits of the genus *Rhacophorus* we have the three main divisions, into which the phenomena of protective coloration may be divided, all well illustrated ; in the first place, there are species, like *R. leprosus*, which are coloured to suit their habitual environment, having little power of adapting their colour to any other environment ; in the second place, there are species, like *R. leucomystax*, which can, to a certain extent, adapt themselves so as to be concealed in environments of several different kinds ; while in the third, there are species, like *R. robinsonii*, which appear to resemble some definite object, in this case a dying leaf, not necessarily to be found in the environment in which they are seated for the moment, but which might very well occur in surroundings of the kind.'

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1. *Proc. Zool. Soc.*, 1899, p. 899.

2. *Proc. Zool. Soc.* 1900, pp. 849-852.

**15. *Ixalus larutensis*, Blgr.**

(Pl. V, Figs. 3 and 4)

Snout rounded or obtusely pointed, as long as the diameter of the orbit ; canthus rostralis distinct ; loreal region concave ; nostril a little nearer the end of the snout than the eye ; interorbital space as broad as the upper eyelid ; tympanum moderately distinct in the adult, indistinct in the young, half the diameter of the eye. Fingers free, toes half webbed ; discs of fingers as large as the tympanum ; subarticular tubercles moderate ; a small inner metatarsal tubercle. The tibio-tarsal articulation reaches between the eye and the tip of the snout. Upper parts smooth, or with small flat warts ; throat, belly, and lower surface of thighs granulate. Grey brown or reddish-brown above, with dark brown symmetrical markings, a cross-band between the eyes being constant ; usually a )( or )-(shaped marking on the anterior part of the body ; sides of body and of thighs with white spots on a brown ground, or between a brown network ; a dark-brown lumber spot may be present ; limbs with dark cross-bands ; lower parts white, spotted or speckled with brown. One of the two young specimens from Jalor has a whitish vertebral line from end of snout to vent, a similar line along the upper surface of the thigh and leg and another from the chin to the breast ; the lower parts are obscured by brown mottlings.

From snout to vent, 35 mm.

This species was described in 1900<sup>1</sup> from specimens obtained in the Larut Hills, between 4,000 and 4,500 feet altitude. Two young specimens from Bukit Besar (2,500 to 3,500 feet) are in Messrs. ANNANDALE and ROBINSON'S collection, and are here figured.

'The specimens were found among dead leaves, to which they bore a remarkable resemblance, on the jungle floor.'

**16. *Ixalus horridus*, sp. nov.**

(Pl. VI, Fig. 2).

Very similar in general appearance to *Rhacophorus leprosus*, SCHLG., and *R. costicalis*, BLGR. Head rather strongly depressed, the obtusely pointed snout a little longer than the diameter of the orbit ; canthus rostralis obtuse ; loreal region concave ; nostrils close to the end of the snout ; interorbital space a little narrower than the upper eyelid ; tympanum distinct, as large as the eye. Fingers half webbed, with large terminal expansions which are broader than long, and as broad as the diameter of the tympanum ; toes webbed to the disks, which are smaller than those of the fingers ; terminal phalanx bifurcate ; subarticular tubercles of fingers and toes very small ; a small, oval,

1. *Ann. Mag. Nat. Hist.* (7) VI, p. 187 (1900.)

inner metatarsal tubercle. The tibio-tarsal articulation reaches between the eye and the tip of the snout. Upper parts with very prominent, irregular large warts, themselves studded with granular asperities in the adult; throat, breast, lumbar, and antero-femoral region and lower surface of limbs smooth; belly and anal region with large flat granules. Dark warm-brown above, with rather indistinct blackish spots on the body and regular cross-bars on the limbs; the granular asperities greyish; a large black lumbar spot; webs blackish; lower parts white ('bright blue-grey' in life), largely spotted and marbled with black. Male, with a large soft pad on the inner side of the first finger and an internal vocal sac.

From snout to vent, 40 mm.

*Description of Tapole.* Body much depressed, a little longer than broad, its length one and three-fifths to one and three-fourths in that of the tail. Eyes superior, two and one-half to three diameters apart; distance between nostrils about two-thirds interocular width. Mouth ravid in type, elliptical, its width a little greater than the interocular. Beak black, sides and lower edge of the lip fringed with papillae, upper lip with a long series of fine horny teeth, followed on each side by three series, three interrupted series of teeth on the lower lip. Spiraculum on the left side, in the posterior third of the body, directed straight backwards. Anus turned to the right, close to the lower edge of the tail. Tail two and two-thirds to three times as long as deep, rounded at the end, the depth of the muscular portion, in the middle of the length, about half the total depth, the upper caudal crest does not extend on the body.

The length of the numerous specimens, which are uniform dark-brown or blackish, with the lines of sensory organs distinct and whitish, varies between 15 mm. and 50 mm.

'A considerable number of adults of this species inhabited a tree in the jungle near our camp on Bukit Besar, occasionally manifesting their presence by low grunts or croaks, uttered singly at intervals. The tree was one of those from the lower part of whose trunk large buttresses project, and in its case these buttresses had coalesced in pairs, so as to form cavities, which contained several gallons of rain water and dead leaves. The frogs deposited their spawn on the trunk in frothy masses about the size of a cricket ball, a foot or two above the surface of the water in these cavities, which was of a deep brown colour. The masses resembled those produced by *Rhacophorus leucomystax*, but were rather smaller and paler in colour. I found that if they were not washed down by the rain into the water within three or four days, the froth dried up and the ova perished. The cavities

were haunted by a snake, *Tropidonotus chrysargus*, two specimens of which were taken feeding on the spawn, despite the froth in which it was embedded.

‘The ova were quite devoid of colour, but the larvae soon assumed an almost uniform velvety black hue. The blue grey, so conspicuous on the belly of the adult, did not commence to make its appearance until the hind legs were fairly well developed, and was much less intense on the young frog than in the older specimens, being in very young individuals merely greyish-white. The dorsal surface of the adult so closely resembled the bark of the tree on which our specimens were taken, that I was unable to distinguish any of the individuals captured in the shadow of the buttresses, and only knew of their presence through their croaking or when they moved; they were caught with a net in the water in the cavities, into which they dived when the trunk was tapped.

‘The resemblance, both above and below, between this species and *Rhacophorus leprosus*, known from the mountains of Perak, is very close indeed, and is probably an instance of adaptive resemblance or “convergence,” though the two frogs belong to closely allied genera, seeing that they both differ widely in appearance from the typical members of their respective genera. Their habits appear to be identical,<sup>1</sup> and it is probable that a very close resemblance also exists between their larvae, which live under very similar conditions, but it is not known whether the species are found together. It would almost seem as if there was some physiological connexion in these genera between a warty, bark-like dorsal surface, and a blue-grey belly, mottled with black, as it is most improbable, in consideration of the conditions under which these frogs live, with their bellies closely pressed against the bark of trees, that the conspicuous coloration of the ventral surface is an advertisement to enemies. The coloration does not appear to be altogether parallel to that of *Bombinator*, as the species of the latter genus are said to display the brilliant orange or yellow of their bellies at the sides of the body, though the fable that they turn over on their backs to do so has been refuted.<sup>2</sup> It may be pointed out, however, as Dr. GADOW himself confesses, that it is not always possible to induce tame individuals of this genus to adopt the ‘warning attitude,’ and that it is just possible that the attitude has primarily no connexion with the coloration of the ventral surface, as it is one paralleled by the common attitude of alarm of many animals which are soberly coloured below, even by certain Orthoptera and Crustaceans. In this case, boldly contrasting patterns on the belly of these four Batrachians may very well have a common origin in each instance, though we cannot at present state their object.’

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1. Cf. L. Wray, *Perak Museum Notes and Journ. Straits Branch Roy. Asiat. Soc.*, 1890, p. 144.

2. Gadow, *Amphibia and Reptiles*, pp. 156, 157.

## REPTILIA

## CHELONIA

## TESTUDINIDAE

1. **Batagur baska**, Gray

A young specimen from the lower reaches of the Patani River.

2. **Damonia subtrijuga**, Schlg. & Müll.

Lower reaches of Patani River.

3. **Cyclemys amboinensis**, Daud.

Kampong Jalor.

‘Also common in the pools on Cape Patani, where it is frequently kept as a pet by the Malay children ; its fat is used as a medicine for fever.’

4. **Cyclemys platynota**, Gray

Kampong Jalor.

5. **Cyclemys annandalii**, sp. nov.

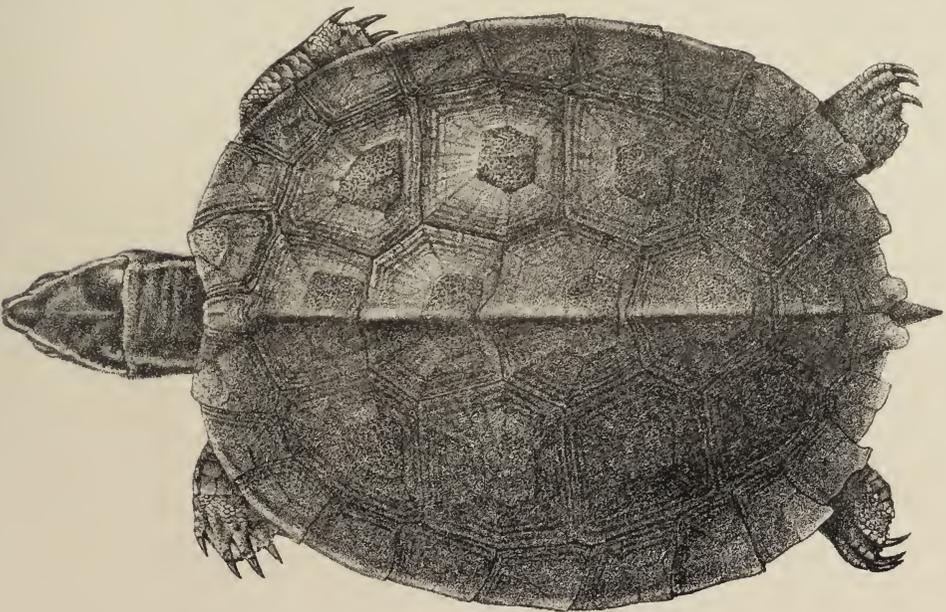
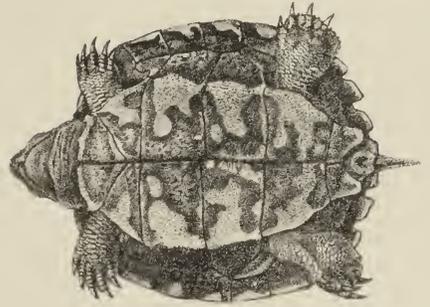
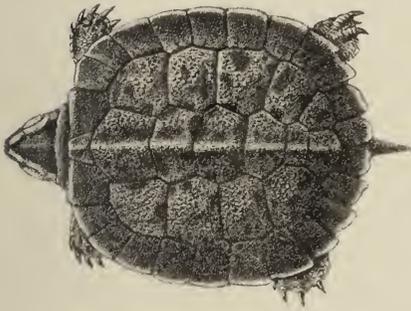
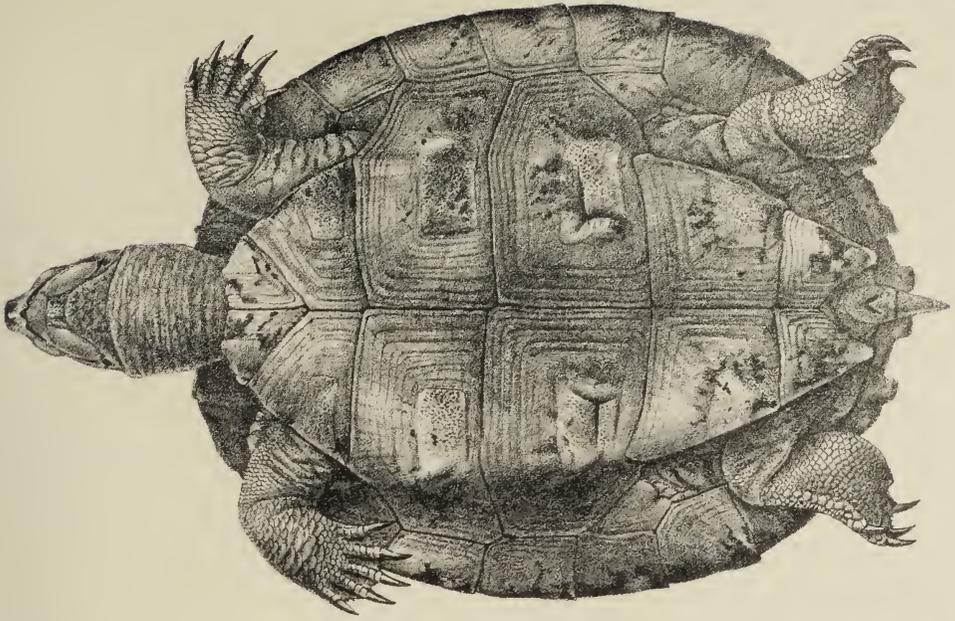
(Plates VII and VIII)

Belongs to the first section of the genus, including *C. platynota*, *dhor*, and *mouboti*, characterized by the plastron not completely closing the shell and being emarginate posteriorly, and by the separated posterior margin of the carapace. Agrees with *C. platynota* in having the suture between the pectoral shield and the marginals longer than that between the abdominal and the marginals, but differs chiefly in the stronger bicuspid beak, the denticulate border of the upper jaw, the more slender zygomatic arch of the skull, the larger axillary shield, the smaller anal shields with a deeper notch between them, and, normally, in the absence of a sixth vertebral shield.

This species, with which I have much pleasure in connecting the name of Mr. ANNANDALE, is founded on three specimens from Kampong Jalor ; two young in spirit, and a large male, preserved dry, with skin and skeleton.

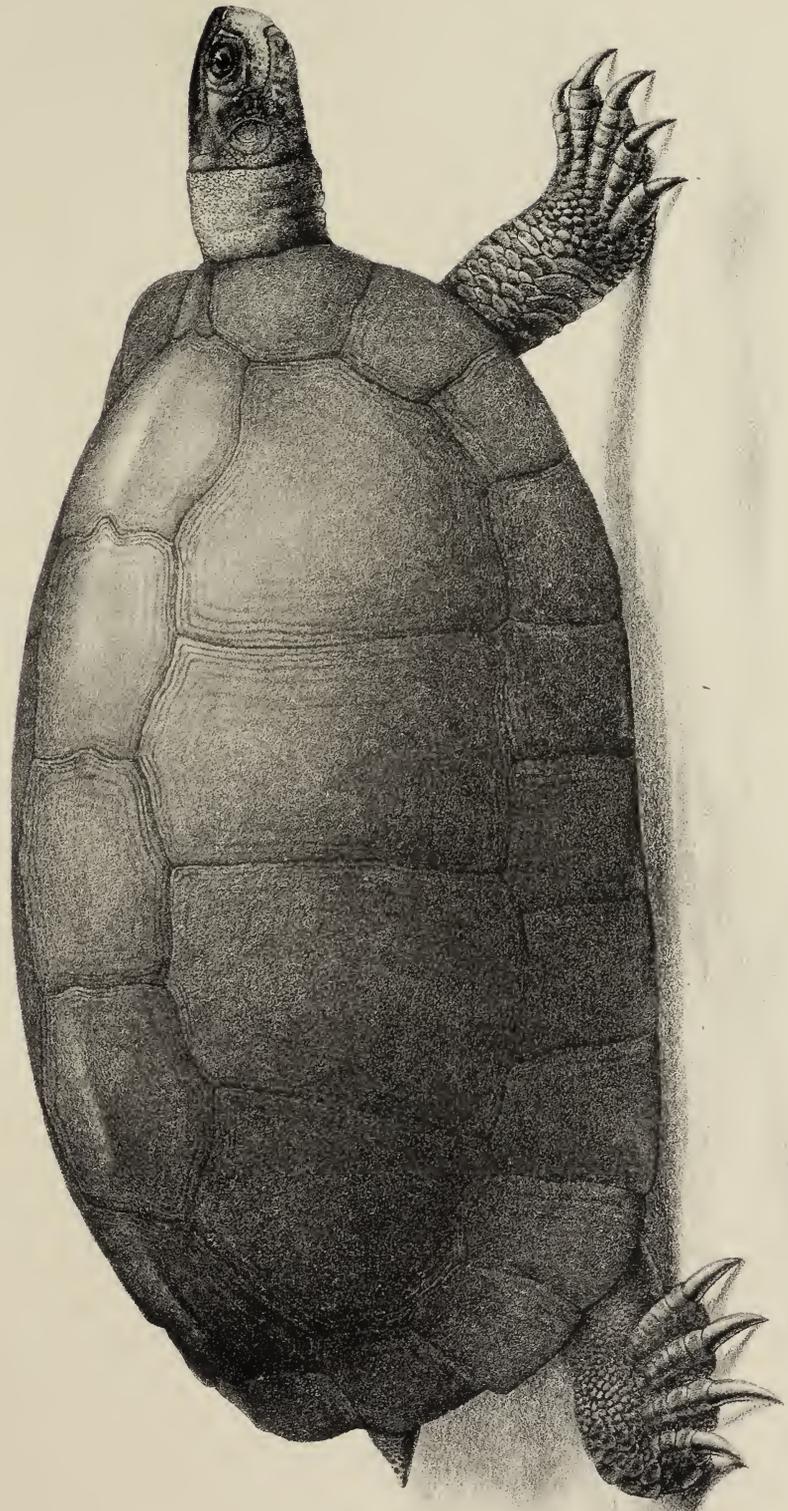
*A. Description of the Young.*

Carapace depressed and unicarinate, with serrated posterior margin, vertebral shields broader than long, as broad as or a little narrower than the costals, first as broad, or nearly as broad, as the second. Plastron narrower than the opening of the shell, with deeply notched hind



CYCLEMYS ANNANDALII, YOUNG. ( $\frac{2}{3}$  NAT. SIZE).





CYCLEMYS ANNANDALII ( $\frac{2}{3}$  NAT. SIZE).



lobe, and connected with the carapace by a distinct bridge, the width of which is contained twice-and-a-half in the length of the plastron; axillary and inguinal shields large, the suture between the pectoral shield and the marginals longer than that between the abdominal and the marginals, the suture between the pectoral shields as long as or a little shorter than that between the abdominals, the suture between the humeral shields shorter than that between the gulars, and that between the anals shorter than that between the femorals. Hook of the upper jaw bicuspid. Digits extensively webbed, claws long, curved, sharp. Front part of the jaw with broad, band-like transverse shields. Carapace dark brown, spotted with black in the young, plastron and lower surface of marginal shields yellowish, with symmetrical dark-brown markings in the young. Head and upper surface of the neck dark-brown; a yellowish streak on each side of the head, from the upper surface of the snout to the neck, passing above the eye and the tympanum, another, higher up, and parallel with the lower, on the temple, on the neck, lower jaw and edge of upper jaw, yellowish.

Of the two specimens, one (*a*) is newly born, the other (*b*) considerably older.

(*a*) Length of shell, 60 mm.; width, 55 mm.; depth, 28 mm. Shields rugose; an additional shield intercalated between the fourth and fifth vertebrals, and another between the fourth costal and the fifth vertebral. Vertebral keel and edge of marginals yellow; roundish black spots irregularly disposed on the vertebral and costal shields; marginal shields blackish above, speckled with lighter in their proximal third. Plastron with a complicated dark pattern with rounded outlines, between which are dark vermiculations; similar markings cover the bridge and the greater part of the lower surface of the marginals.

(*b*) Length of shell, 145 mm.; width, 117 mm.; depth, 67 mm. Shields with concentric grooves and radiating ridges around the rugose portion.

Traces of the symmetrical dark markings of the younger specimen can be observed on the plastron.

### *B. Description of the Adult Male.*

Shell three times as long as deep, once and two-thirds as long as broad; its posterior border much less strongly serrated than in the young; shields nearly smooth, with the vertebral keel merely indicated on the fourth and fifth vertebral shields; second and third vertebral shields as long as broad, about two-thirds the width of the corresponding costals; plastron deeply concave, the relative proportions of the shields as in the young. Upper jaw with two very strong median cusps, and a very distinct denticulation

along the whole border. The interdigital web appears to have been less developed than in the young. Tail nearly as long as the head. Shell black, with yellow markings over the marginal shields and on the plastron, the latter forming a broad median band; head blackish, vermiculate with yellowish, but without longitudinal bands.

Length of shell, 380 mm., width, 245 mm., depth, 130 mm.

‘Numerous specimens were brought to us at Kampong Jalor by natives, who frequently keep this tortoise in captivity, boring a hole in the posterior margin of the carapace, and tying a string, passed through this, to their house-posts. We were prevented from preserving more than one large specimen by the bulk, and by the difficulty experienced in killing tortoises. The adult appears to be largely terrestrial in habits, but it is probable that the young are aquatic. The species probably attains a bulk considerably greater than that of our adult specimen.’

#### 6. *Cyclemys dhor*, Gray

A young specimen from Kampong Jalor.

#### 7. *Geoemyda spinosa*, Gray

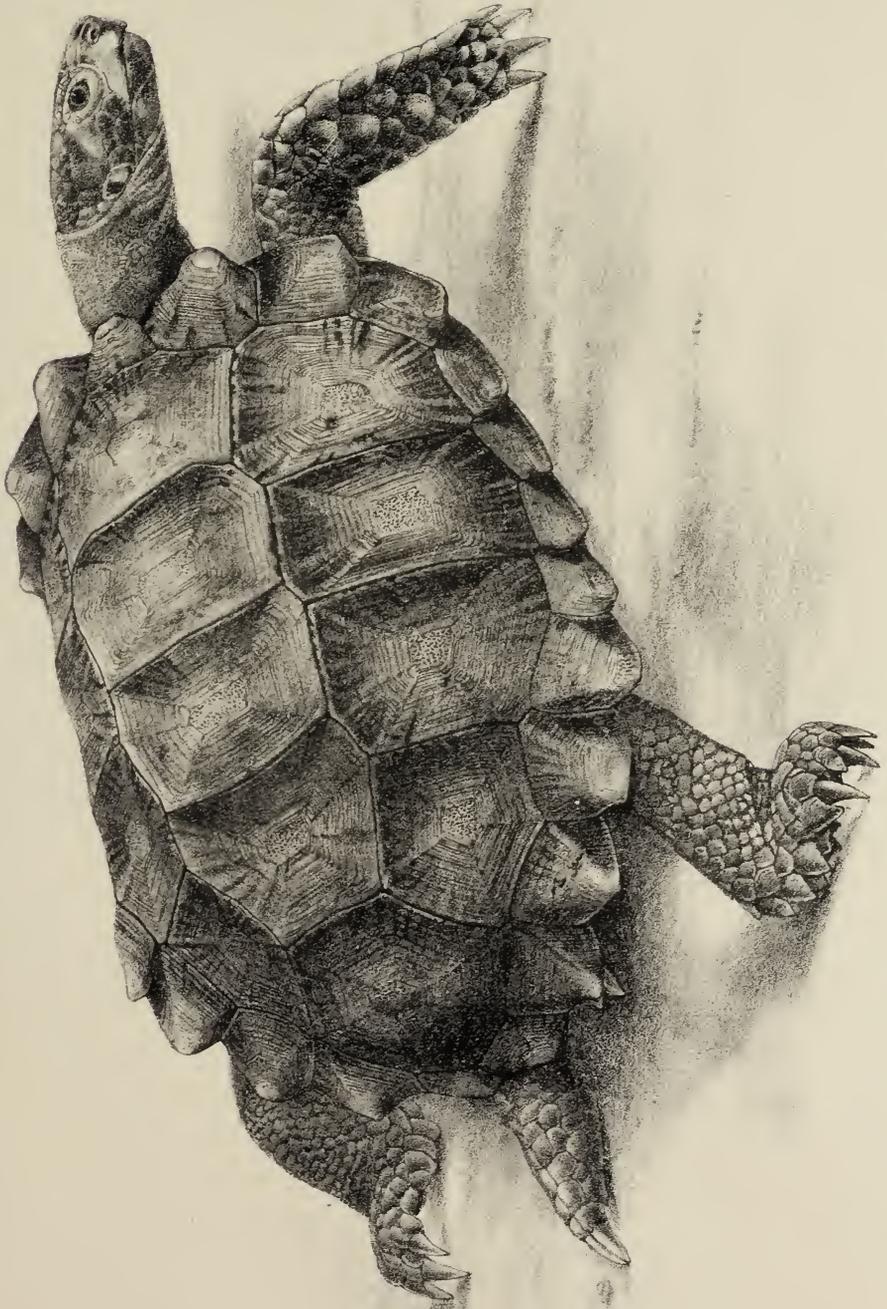
A young specimen from Kampong Jalor, another from the Batang Padang district.

‘Common in the flooded rice fields of the Patani States.’

#### 8. *Testudo pseudemys*, sp. nov.

(Pl. IX)

Shell much depressed, its depth one-third to two-fifths its length; anterior and posterior margins reverted and strongly serrated; nuchal shield present, rather large, broader than long; supracaudal shields two, embracing a deep notch; discal shields concentrically striated and more or less concave; vertebrals much broader than long, at least as broad as the costals, the second, third, and fourth, with the antero-lateral side not half as long as the postero-lateral. Plastron large, gular region more or less produced and notched, hind lobe deeply notched; width of the bridge one-third to two-fifths the length of the plastron; pectoral shields meeting on the median line, the suture between them measuring one-seventh to one-third the length of that between the humerals; axillary shield very small, inguinal large. Head rather small; temporal arch narrow, slender, its width not more than one-fifth the diameter of the orbit; two large prae-frontal shields and a large frontal; jaws not hooked, not denticulate, the alveolar surface of the upper jaw with a feeble median ridge. Limbs with very large bony, imbricate tubercles, some of



TESTUDO PSEUDEMY'S. ( $\frac{1}{2}$  NAT. SIZE).



which, on the front of the fore limb and on the heel, are pointed and spine-like ; a group of bony tubercles on the back of the thigh, the central ones very large and conical. Tail of male ending in a divided, claw-like bony tubercle. Yellowish or pale brown, dark brown or blackish on the periphery of the dorsal shields and on the anterior border of the marginals ; young with the carapace speckled with blackish ; plastron yellow or brown and yellow ; head and limbs yellow, more or less variegated with dark brown.

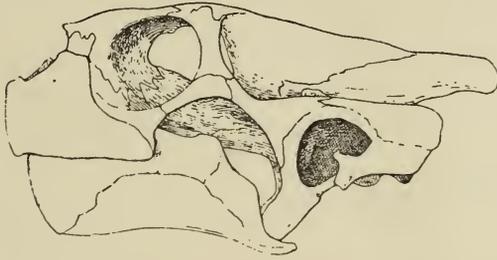


FIG. 1. Skull of *Testudo pseudemys*. Two-thirds natural size.

These tortoises agree in colour and general appearance with the shell from Siam described by Dr. GUNTHER as *Geoemyda impressa*, but they differ from it, as well as from all specimens of *Testudo emys* examined by me, in having the antelateral side of the vertebral shields so much shorter than the postero-lateral. The skull of *Geoemyda impressa* is unknown, but that of *Testudo emys* and that of *Testudo phayrii* differ from that of *Testudo pseudemys*

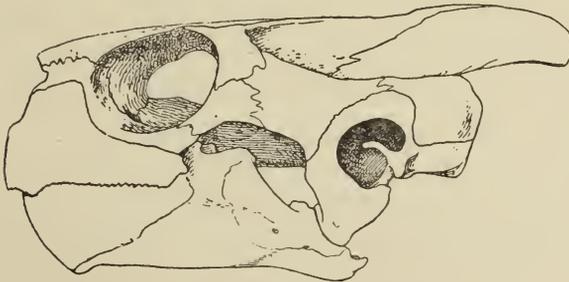


FIG. 2. Skull of *Testudo emys*. Two-thirds natural size.

in the much wider temporal arch, as may be seen by the annexed figure, taken from a specimen from Sarawak.

Two specimens, from the Batang Padang district, South Perak (1,000 feet to 2,000 feet), in the collection, the shell of the larger measuring 255 mm., that of the other 100 mm. I have besides examined a specimen from the Larut Hills, Perak (4,000 feet altitude), obtained by Mr. A. L. BUTLER in 1900, and a young specimen from Thao, Kasia Hills (3,200 feet

to 4,500 feet), collected by the late Mr. L. FEA, and which I first referred to *Testudo emys*.<sup>1</sup>

I have lately examined a rather large number of specimens of *Testudo emys*, from the Malay Peninsula and from Borneo, and doubts, similar to those expressed by Dr. VON LIDTH DE JEUDE,<sup>2</sup> have arisen in my mind as to the specific identity of *Testudo phayrii* and *Geoemyda impressa*. The type of the former having been carefully figured by ANDERSON,<sup>3</sup> and the skull of its co-type by GRAY,<sup>4</sup> it is possible to form a correct idea of the specimens with which to compare the new material. Both the tortoises brought home by Messrs. ANNANDALE and ROBINSON agree with *Testudo phayrii* in the shape and proportions of the plastral shields, and in having the nuchal shield much wider than long, but the carapace is more flattened, more of the lateral marginal shields being visible when the shell is viewed from above, and the second and third vertebral shields have a different shape, their antero-lateral borders being much shorter than the postero-lateral. The greater depression might be merely due to age, the type of BLYTH's species measuring 510 mm. in shell-length. As to the second differential character, it appears to me to be of specific importance, and, coupled with the difference in the temporal arch, suffices to separate *T. pseudemys*.

In all the specimens,<sup>5</sup> four in number, which agree with *T. emys* in having the pectoral shields of plastron more or less widely separated from each other, the antero-lateral border of the second and third vertebral shields is as long as the postero-lateral, or but slightly shorter; this is quite irrespective of the great difference in shape which these shields undergo with age, the shells at my disposal varying from 120 to 480 mm. in length. With one exception (the type of *Manouria fusca*, GRAY, from Penang), all these specimens have the nuchal shields as long as broad, or longer than broad.

Judging from the figure given by GRAY, the skull of *T. phayrii* is identical with that of *T. emys*; and as the extent of the pectoral shields is a character subject to considerable variations according to ANDERSON, whose figures show a gradual passage between the two extreme types, I think it best to provisionally maintain the species *T. emys* in the sense in which I have taken it in the *Catalogue of Chelonians* published in 1889.

'The two specimens of *Testudo pseudemys* were taken on a jungle path at dusk, within a few yards of one another. When alarmed they drew in their

1. *Ann. Mus. Genova* (2) xiii, 1893, p. 312.

2. *Notes Leyd. Mus.* xvii, 1895, p. 197.

3. *Proc. Zool. Soc.*, 1871, p. 426.

4. *Proc. Zool. Soc.*, 1869, p. 470 (*Scapia falconeri*).

5. Mostly from Borneo; three from Penang, two from the Larut Hills, Perak.

heads, but when lifted from the ground became very vicious, hissing, stretching out their necks and attempting vigorously to bite, their whole demeanour differing from that of specimens of *T. emys* I have seen in captivity in the Malay Peninsula.'

**9. Testudo elongata**, Blyth

Kampong Jalor.

'Several specimens were brought us by natives at Kampong Jalor, and they said it was common among the granite rocks of a hill in the neighbourhood, named Bukit Bubu (Bald Hill), never being found in the vicinity of water. They called it *kura-kura*<sup>1</sup> *mas*, or 'gold tortoise,' because of the bright yellow colour of parts of the shell. In life the soft parts are of a pallid and slightly yellowish flesh-colour, and in all the specimens we saw, the nose was pink and inflamed, owing to the head and neck having been used as a lever to right the animal when it had been turned on its back.'

**CHELONIDAE**

**10. Chelone mydas**, L.

**11. Chelone imbricata**, L.

Both the green turtle and the hawksbill occur at the mouth of the Patani River. 'Their eggs, a perquisite of the Malay raja, are collected in enormous numbers, both on Cape Patani and more especially on certain small islands off the coast, a little to the north; but it is difficult to know what the turtles feed upon here, as the sea in these parts is almost devoid of sea-grass and large algae.'

**EMYDOSAURIA**

**CROCODILIDAE**

**12. Tomistoma borneensis**, Schl. & Müll.

A gavial-like crocodilian was observed by Mr. ROBINSON, lying on a log in the Sungkei River, between Jeram Kawan and Sungkei, South Perak.

**13. Crocodilus porosus**, Schn.

Jambu, Jhering.

'The distribution of this crocodile in the Patani States is somewhat local, probably because it needs muddy banks on which to sun itself. It is abundant on the Jambu River, which is little more than a tidal creek, the larger specimens, as a rule, staying some distance up stream, but occasionally descending to the sea. On the lower reaches of the Patani River it is scarce,

1. *Kura-kura* is their general name for tortoises, but the large species of *Cyclemys* are called *lelagu*, while land tortoises are known as *baning*, and the Trionychidae as *labi-labi*. N. A.

and the species which is abundant above Bendang Stah is very probably *C. palustris*; it occurs on the islands of the Taleh Sap and in the Lampam River, for a Siamese crocodile hunter at Lampam showed me a number of skulls, all of which appeared to be those of *C. porosus*. He told me, however, that about one individual in every hundred he killed had a very long nose, with a lump at the end, that is to say, probably, was a specimen of *Tomistoma borneensis*.

## LACERTILIA

### GECKONIDAE

#### 14. *Gymnodactylus marmoratus*, Kuhl.

Bukit Besar. 2,500 feet.

‘Not uncommon on tree-trunks in the jungle. When disturbed it frequently runs down to the ground, and takes refuge in one of the rats’ holes common at the roots of trees.’

#### 15. *Gymnodactylus pulchellus*, Gray

Bukit Besar, 2,500 feet, and Goah Tanah (Earth Cave), near Biserat.

‘The specimen from Bukit Besar was obtained from a hole in the trunk of a dying palm, about thirty feet above the ground. Those from the Jalor cave were found crawling on the sides and floor in absolute darkness; there are specimens, taken in a similar habitat in Selangor, both in the State Museum at Kuala Lumpur and in the Raffles Museum at Singapore.’

#### 16. *Gonatodes affinis*, Stol.

Bukit Besar. 2,500 feet.

‘Dorsal surface dull grey, mottled with black and closely banded with yellow; mid-dorsal line slightly paler yellow; a large black spot, with a bright yellow “eye” in the centre, and bordered posteriorly with the same shade, just behind the base of the fore limbs, these markings being far more conspicuous in the male than in the female; three faint yellowish lateral bars.’

‘Common on tree-trunks in the jungle, especially on the one on which the frog *Ixalus horridus* was taken. The gecko was generally found between the upper part of the buttresses of this tree, but when it was disturbed it slipped down into the water in the cavities, beneath the surface of which it remained for some minutes, finally pushing out its head at one side so carefully that not the slightest commotion was caused. The roughness of its integument caused it to be covered with a film of air while beneath the surface of the

water, but it is doubtful whether this was anything but adventitious. Besides these geckos and frogs, and also snakes, the pools in the cavities were inhabited by numerous insects—Hemiptera and larval Diptera, Beetles and Odonata.’

**17. Hemidactylus frenatus**, D. & B.

Patani ; Gedong and Tapah, South Perak ; Kuala Lumpur, Selangor.

**18. Hemidactylus platurus**, Schn.

Patani ; Bukit Besar.

**19. Gehyra mutilata**, Wieg.

Bidor, South Perak.

‘The three preceding species are all common in houses, both in the Patani States and in Perak. They all exhibit considerable power of colour change, becoming at night, under the influence of strong light reflected from whitewashed walls, of a peculiar translucent pale yellowish brown. If, however, they run across any dark object on the walls, they immediately become darker.’

**20. Gehyra butleri**, Blgr.

Kuala Lumpur.

Described in 1901<sup>1</sup> from three specimens obtained by Mr. A. L. BUTLER, at Kuala Lumpur, the largest measuring 32 mm. from snout to vent. The specimen brought home by Mr. ROBINSON measures 35 mm. from snout to vent, and has six lamellae under the inner toe, and eight under the fourth. Reddish above, speckled with brown and with yellow dark-edged ocelli, the ocelli closely approximating in pairs on the tail.

‘I obtained several specimens of this species in Selangor, which, so far as my observation goes, is rarely found in houses. All my specimens were captured among the fibre at the base of the leaves of cocoanut palms, where they seem to feed largely on the small centipedes and millipedes found in such situations.’ H.C.R.

**21. Gecko verticillatus**, Laur.

Jalor.

‘This species is common on the trunks of cocoanut palms in the Patani States, but does not live in the houses either in this district or in Senggora,

where there are many large brick and plaster buildings, as it does in Bangkok,<sup>1</sup> where I have seen it commonly in European dwellings. It appears to have no power of colour change.'

**22. *Gecko stentor*, Cant.**

Batang Padang.

'Though somewhat scarce in collections, this gecko is really common in the Malay jungle, especially in Upper Perak and the adjacent parts of Rhaman, where I heard its characteristic cry almost continuously. It is usually a jungle species, frequenting the upper branches of high trees, but a large specimen, now in the State Museum at Taiping, Perak, was taken in a hospital (built at the edge of the jungle), in the walls of which its cry had disturbed the patients for some time. Our specimens were shot on trees by the Sakais, with their blow-guns; they consider its flesh a delicacy. The changes of colour undergone by the individuals of this species are very slight, being confined to a slight paling or darkening.

'The characteristic note of this large gecko is often heard in certain bungalows in Kuala Lumpur.' H.C.R.

**23. *Gecko monarchus*, D. & B.**

Bidor, South Perak; Kuala Lumpur, Selangor.

'The species appears to be somewhat particular as to its environment, occurring abundantly on the walls and ceilings of some houses, but avoiding others close to them. It has very little power of colour change.'

**24. *Ptychozoon homalocephalum*, Gray**

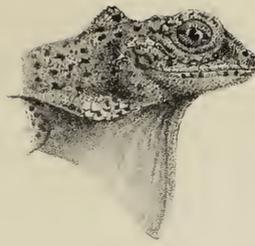
Two newly hatched young, from eggs obtained on Bukit Besar.

'The eggs, of which several sets, hatched and otherwise, were noted on Bukit Besar, are deposited in pairs, on the lower surface of leaves or on tree-trunks, sometimes quite near the ground. They have brittle calcareous shells, but must be soft when laid, as they are flattened where they come in contact with one another, the outline of the two together forming a figure of eight, and as the lower surface, which is also flattened, retains an impression of the surface to which it clings and on which the eggs have been laid. The eggs measure about 13 mm. in diameter, and 11 mm. in depth. The period of incubation is long for so small an animal; in the case of the eggs of a captive specimen

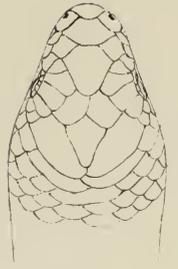
1. Cf. S. Flower, *P.Z.S.* 1899, p. 632.



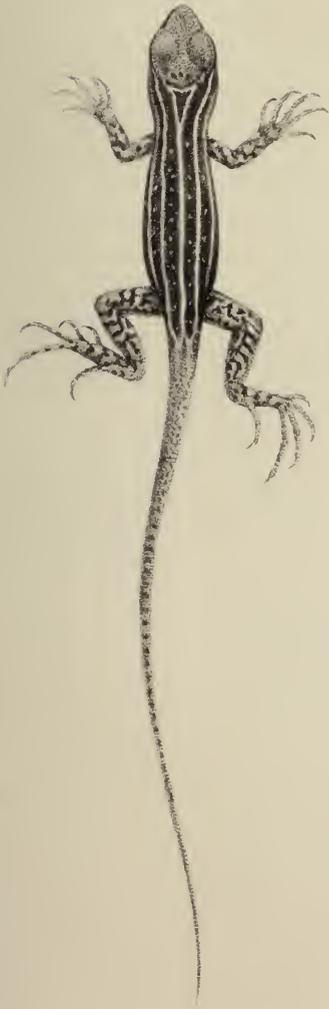
1b.



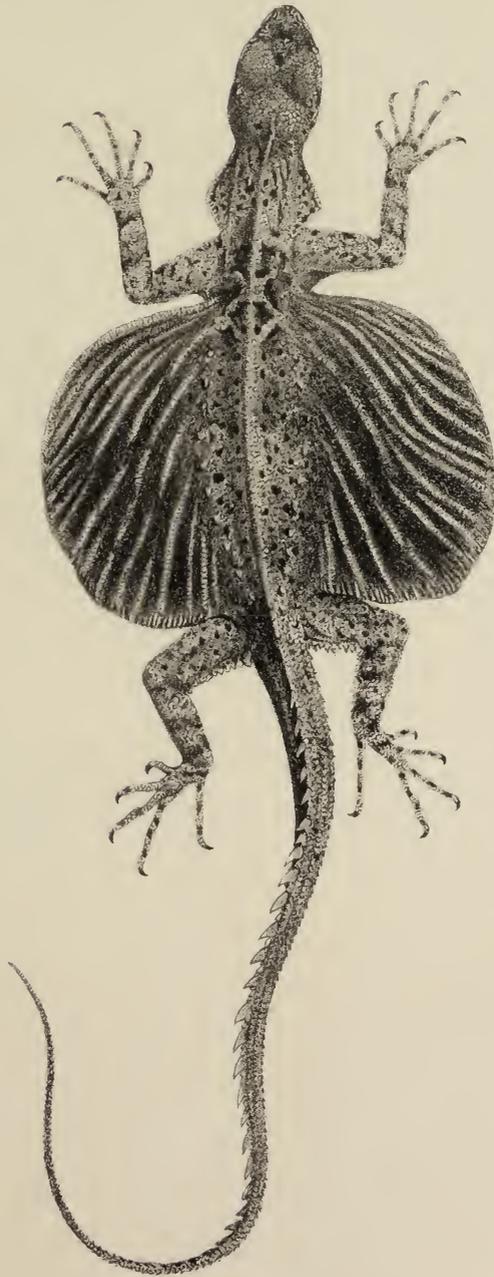
1a.



3a.



2.



1.



3.

J Green del et lith.

1. DRACO PUNCTATUS. 2. LIOLEPIS BELLII.  
3. LYGOSOMA MIODACTYLUM.

Mintern Bros imp.



in Java, F. H. BAUER<sup>1</sup> found that it lasted from November to May; specimens obtained by ourselves in May, in which the embryos were already far advanced, hatched a month later, and we found others, some advanced and some in an early stage of development, in September. When the young geckos emerged they were covered with a delicate membrane, which they cast immediately, rubbing it off against sticks and pulling it from the hind limbs with their mouths, and then devouring it. One specimen was kept alive for about a fortnight, during which it evinced not the slightest tendency to make use of the fold of skin along its side as a parachute. Indeed, this fold, except when accidentally displaced by coming in contact with some foreign substance, was always kept closely tucked round the body, so that it was hardly apparent. The young gecko, which was coloured so as to exactly resemble the bark of a tree, was slightly darker by night than by day, a white bar across the tail becoming more conspicuous in the evening; otherwise the colour changed very little.'

## AGAMIDAE

### 25. *Draco fimbriatus*, Kuhl.

Sungkei, South Perak, and Semangko Pass (2,700 feet), Selangor-Pahang boundary.

'General colour above greyish, brown on head and neck, with irregular spots of black, tail banded with blackish brown and clay colour; lower surface of body uniform dirty grey, chin dusky grey, spotted with black and white on jaws, gular pouch salmon pink, lateral folds more orange.'

### 26. *Draco punctatus*, Blgr.

(Pl. X, fig. 1)

Head rather large; snout as long as the diameter of the orbit; nostril lateral, directed upwards; tympanum naked, nearly as large as the eye-opening. Upper head-scales small, keeled; a distinct **A**-shaped series of enlarged scales on the forehead; a conical, spine-like tubercle at the posterior corner of the orbit and another in front of it; ten upper labials. The male's gular appendage hardly as long as the head. A short and strong denticulate nuchal fold. Dorsal scales a little smaller than ventrals, feebly keeled; a lateral series of enlarged scales. The fore limb stretched forwards extends a little beyond the tip of the snout; the adpressed hind limb barely reaches the axil. Tail with a very strong crest of long pointed scales. 'Greyish above, tinged with rusty on the crown and on the middle line of the back, with numerous small black spots; four large dark blotches forming a cross between the shoulders; alar

membrane blackish above, streaked with whitish, uniform whitish beneath ; lower parts bluish, throat and breast with small blackish spots ; gular appendage and inner side of lateral wattles bright chrome-yellow.'

Total length, 230 mm. ; head, 17 mm. ; width of head, 12 mm. ; body, 67 mm. ; fore limb, 37 mm. ; hind limb, 43 mm. ; tail, 145 mm.'

This species was known from one specimen from the Larut Hills, Perak, and a second from Sarawak.

A single male was obtained on Bukit Besar, 2,500 feet ; shot on a tree in the clearing.

*Draco punctatus* is most nearly related to the Bornean *D. cristatellus*, G<sub>THR.</sub>, from which it differs in the stronger caudal crest, in the presence of a dorso-lateral series of enlarged scales, in the shorter gular appendage, in the rather larger upper head-scales, and in the perfectly lateral nostril.

#### 27. *Draco melanopogon*, Blgr.

Bukit Besar. 2,500 feet.

This species is now known to have a wide distribution, as it has been recorded from various localities in the Malay Peninsula (Malacca, Singapore, Ulu Selama, Bukit Besar) and from Borneo, Sumatra, and the Natuna Islands.

The specimens from Bukit Besar (males) are described as having in life the dorsal surface moss-green and black, the ventral surface cream, marked with dark brown ; gular pouch black and white ; alar membrane black, spotted with golden yellow.

#### 28. *Draco formosus*, Blgr.

Bukit Besar, 2,500 feet ; and Patang Padang, South Perak.

'Sides of throat deep claret-colour ; upper surface of alar membranes pale gamboge, with five irregular bars of blackish mottling, becoming claret-colour towards the outer edge ; a broad subterminal zone of paler claret and dull yellow mottled with black.'

'A pair of this species, probably a male and female, sailed into our clearing from the jungle and alighted on a large tree-trunk on several occasions, generally towards evening. The last to alight was once or twice secured, but the first always escaped. If unmolested, the former chased the latter up the tree in a spiral course, until they disappeared among the branches.

'The common *D. volans* has the same habit, and in its case it is easy to distinguish the sexes by the colour of their gular appendages. *D. volans*,

of which we did not obtain a specimen, is somewhat sporadically distributed in the Patani States, occurring in fair numbers on the trunks of the coconut and betel palms in some villages, while apparently absent from others. When seated on the trunks of these trees, however, its coloration and the immovability of its pose render it practically invisible. On the coast of Trang it is very abundant in the villages, as it is in many parts of Perak—though we did not happen to see it in that state—and Selangor, as well as in Singapore and Penang.'

**29. *Draco blanfordii*, Blgr.**

Bukit Besar. 2,500 feet.

**30. *Gonyocephalus borneensis*, Schlg.**

Semangko Pass, Selangor-Pahang border. 2,700 feet.

'I took the specimen representing this species; it was seated on a chair in the Government Resthouse, on the Semangko Pass, and was very sluggish. I have noticed the same sluggishness in the case of the North Australian *G. boydi*. Young individuals were not uncommon in the neighbourhood, and were exceedingly active and difficult to capture.' H. C. R.

**31. *Gonyocephalus herveyi*, Blgr.**

Batang Padang, South Perak.

**32. *Gonyocephalus grandis*, Gray**

Batang Padang, South Perak.

'The specimens in our collection of this and the preceding species were shot by the Sakais with their blowguns. For one of them we are indebted to Mr. G. B. CERRUTI, late Superintendent of Sakais, who also presented us with other zoological specimens from the same district.'

**33. *Acanthosaura armata*, Gray**

Bukit Besar; 2,500 feet.

'I found the specimen digging for earth worms in a small bare patch in the jungle. It had evidently been successful, as its stomach was full of earth. Apparently only its fore limbs were used in digging. When disturbed it rushed into a hole in a tree trunk. Another specimen was seen on Bukit Besar, clinging to the stem of a sapling. When a hand was stretched out to seize it, it dropped rather than leaped into the undergrowth.

‘When first seen, the specimen taken was almost black, with only small blotches of green on the body ; there was a distinct division in the coloration a little behind the fore limbs, and in front of this the shade was much duller than it was on the tail and the hind quarters. When the animal was handled, the green blotches began gradually to expand, until, finally, the comparative extent of green and black was completely reversed. This is remarkable as being exactly the opposite of what takes place when *Calotes cristatellus* is roughly treated.’

### 34. *Calotes cristatellus*, Kuhl.

Jalor, Batang Padang

‘This lizard is the most common Agamid in South Perak and Selangor, and though it is, perhaps, less abundant in the Patani States, it is far from being scarce ; I have seen specimens in Patalung. Though essentially a brush-wood species, it penetrates into high jungle on Bukit Besar. It is rather less active than *C. versicolor*, and often sits quite motionless on tree-trunks, with its head and forequarters raised from the surface to which it clings. It is usually of a bright green colour in life, but if ill-used becomes almost black, the green only remaining in the form of small blotches and veinings, which, however, re-expand if the animal is killed or narcotized.’

### 35. *Calotes versicolor*, Daud.

Jalor and Batang Padang, South Perak.

‘*Calotes versicolor*, the ‘chamaeleon’ of the Europeans of the Malay Peninsula, is very abundant in the northern parts of the Patani States, in Senggora, on the shores of the Taleh Sap, and also in Upper Perak ; but is rare in South Perak. It is an extremely active form, principally found in the neighbourhood of human dwellings. Mr. ROBINSON has watched a specimen seated on a tree trunk, up which a stream of leaf-sewing ants (*Oecophylla smaragdina*) were making their way to their nest. It devoured many as they passed, and there is reason to believe that they form an important item in the food of the species. When this lizard is very much excited and in rapid motion, the locomotion becomes, at any rate for short distances, bipedal.’ I have published an account of the nuptial dance of the Malay ‘chamaeleon’ elsewhere,<sup>2</sup> which is of interest as showing that the changes of colour which have given the lizard its English name proceed, like those of the

1. Cf. E. Green, N. Annandale, and W. Saville Kent ; *Nature*, 1902, vol. lxxvi, pp. 492, 577, and 630.

2. *Proc. Zool. Soc.* 1899, p. 858.

true chamaeleon,' very largely from a psychological or psychico-physiological stimulus. The same view is illustrated by the fact that dark vertical bars, which are a fairly conspicuous feature in the young at all times, only become apparent in the adult when it is annoyed. My note on *Calotes emma* in Dr. GADOW'S *Amphibia and Reptiles* (pp. 518, 519) should refer to this species.'

### 36. *Calotes emma*, Gray

Bukit Besar and Jalor

'General colour pale sage green ; a broad longitudinal band of dirty white on each side ; irregular transverse markings of sienna brown, becoming darker where they cross the longitudinal band ; dorsal and nuchal crests pale sage green ; lateral surface of head bright green, with a dark bar running backwards from the angle of the eye. Skin and base of scales on gular pouch dark crimson lake ; a triangular sooty pouch immediately in front of fore limbs.

'Jalor is, so far as is known, the southern limit of this species, which is quite common in the interior of Patalung ; but it is a jungle-loving form, and, as such, liable to escape detection. Its powers of colour change are slight, consisting chiefly in an accentuation of the darker markings on annoyance or irritation.'

### 37. *Liolepis bellii*, Gray

(Pl. X, Fig. 2.)

Patani and Jalor.

The young from Patani recall, by their livery, the young of various Lacertids of the genera *Acanthodactylus* and *Eremias*. The following notes on their life coloration were taken by the collectors :—'Tail bright brick-red ; median and lateral stripes on body lemon-yellow ; pale yellow spots and faint traces of cross-bars occur between the stripes on the sides. In the adult, the tails become dull grey, and the pale yellow spots and traces of cross-bars increase in size and become orange and purple respectively, more brilliant in the male than the female, while bright blue markings, also more brilliant and more extensive in the male, make their appearance on the ventral surface.

'In the Patani States, and apparently also in Kelantan, Trengganu, and Pahang, *Liolepis bellii* is confined to sandy localities, almost bare of vegetation, between the foot hills and the sea. On the West Coast, it is common on the coast and islands of Trang, and has been recorded from other localities, but

want of suitable habitats makes its occurrence sporadic, and renders it generally rare in the south of the Peninsula. I am now certain that it is monogamic, a single pair inhabiting a burrow, which is shared by several young ones, probably hatched in March or April, at least for some weeks. If an individual is surprised away from home, it does not bolt down the nearest burrow, but makes its way to its own, running with the fore part of the body somewhat depressed and the tail raised high in the air. Within the mouth of its burrow it often turns to view the cause of its disturbance, before disappearing. Mr. LAIDLAW has found vegetable matter in the stomach of specimens from Trengganu,<sup>1</sup> but the ordinary food of the species consists largely of the small Acridiids common in the localities it frequents. A specimen was taken by Mr. ROBINSON climbing a tree-trunk at Sai Kau ; but this is a most unusual position.

‘I have already commented upon the purple and orange cross-bars on the sides of this species at some length ;<sup>2</sup> but I may add, that when the males are fighting they make themselves as flat as possible, thus, incidentally, displaying the brilliant coloration on their sides. They stand facing one another, with the forequarters and head raised as high as possible, and each tries to slip past his adversary’s guard and seize him by the shoulder. At last one catches the other with his jaw, either on the shoulder or the snout, and commences to worry him. If the individual so seized can shake himself free, he bolts. The victor does not pursue, but stands with uplifted head, which he bows repeatedly in the direction of his adversary’s flight, for some minutes, and then makes off in the opposite direction.

‘The brilliant coloration of the young of this lizard affords a good instance of a phenomenon which has not received the attention it merits among students of animal coloration, I mean the fact that young reptiles are very often more brilliantly or more conspicuously coloured than adults of the same species. To give other examples from species actually collected by Mr. ROBINSON and myself in the Malay Peninsula, the young of *Cyclemys annandalii* has yellow streaks on the head, as well as markings on the carapace, which disappear in the adult ; the young of *Crocodilus porosus* and *Varanus salvator* exhibit greater contrasts of colour on their dorsal surface than do the adults ; many Malay Scincidae (e.g., *Mabuia multifasciata*) have longitudinal pale stripes on the dorsal surface of the young that become broken up into inconspicuous spots or blotches, or altogether disappear, in the adults ; the young of the snake *Hypsirhina bocourti* are marked with black and yellow

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1. Proc. Zool. Soc. 1900, p. 309.

2. Proc. Zool. Soc., 1900, pp. 857, 858.

where the adult only displays different shades of inconspicuous brown ; the dorsal cross-bars of black or dark green on several of the Hydrophinae disappear with age, leaving an almost uniform dull green or grey coloration. These are only a few instances, taken from a comparatively small number of species from a very limited area ; but, even from them, it is clear that the young of reptiles lose their characteristic juvenile coloration in one of two ways, either by the fading of brilliant or intense colours, or by the growth of dark pigment, which encroaches upon pale areas, either obliterating them altogether or breaking them up in such a way that they are no longer conspicuous. In some genera the conspicuous coloration persists, in a more or less marked way, through life in certain species, being confined to the young in others, so that it is more probably a vestigial character than a new development ; for example, the yellow streaks on the head which disappear in the adult of *Cyclemys annandalii*, normally persist through life in *C. amboinensis*, while the lateral bars in *Calotes versicolor* are only occasionally visible in this species in the adult (when it is in a state of irritation), generally present in the young, and at any rate closely paralleled in the adult of *C. emma* even when the animal is undisturbed. Of course, sexual coloration, such as the cross-bars on the sides of *Liolepis bellii*, has no connexion with this phenomenon of the juvenile livery, and, equally of course, there are many reptiles which retain a conspicuous or intense coloration, however old they may be, and others which develop such a coloration after their extreme youth is past, for reasons possibly other than sexual. Among Batrachians, conspicuous coloration is rare in youth ; frogs and toads endowed with bright pigment, like *Ixalus horridus*, do not possess it when first they lose their tails, though its extent in later development may be indicated, while almost adult specimens of *Ichthyophis glutinosus*, which I have seen alive in a stream in the Malay Peninsula, have had both the yellow and the black of their characteristic coloration less intense than was the case with larger individuals.'

## VARANIDAE

### 38. *Varanus nebulosus*, D. & B.

Jalor, and Batang Padang, South Perak.

### 39. *Varanus salvator*, Laur.

Jalor.

' On the coast of the Patani States both *Varanus nebulosus* and *V. salvator* are very common, especially on the mud-flats near Jambu, where they stalk

the mangrove crabs and the different "mudhoppers" (*Periopthalmus*, *Boleophthalmus*, and the like), which bask in the sun in such localities. About Biserat and Kampong Jalor, *Varanus nebulosus* is the commoner of the two near the villages; but *V. salvator* is abundant on the limestone hills and in the pools at their base. In the interior of Rhaman and Kelantan, the former species is comparatively rare. Neither species, as a rule, penetrates into deep jungle, where their place is taken by *V. rudicollis* and other scarcer species. In the sheltered waters of Patani Bay, *V. salvator* may occasionally be seen swimming in the sea. It seems to find water more necessary than *V. nebulosus*, which, on the other hand, is more frequently observed on tree-trunks and branches, though both are aquatic and arboreal on occasion. The food of both species includes almost every kind of small animal and carrion. The yellowish markings of the dorsal surface of *V. salvator* are more brilliant and conspicuous in the young than in the adult.'

### LACERTIDAE

#### 40. *Tachydromus sexlineatus* Daud.

Biserat, Jalor

'I have only seen this species in the neighbourhood of Biserat (the one recorded locality in the Malay Peninsula), where it lives among long grass, along the top of which the great length of its tail and the slenderness of its body permit it to run without bending the blades. In life, its tail is very brittle.'

### SCINCIDAE

#### 41. *Mabuia macularia*, Blyth.

Biserat, Jalor.

#### 42. *Mabuia rugifera*, Stol.

Muar River, Selangor

#### 43. *Mabuia multifasciata*, Kuhl.

Jalor, Bukit Besar, Batang Padang (South Perak), and Selangor.

'Probably the common skink of all cultivated parts of the Malay Peninsula.'

#### 44. *Mabuia siamensis*, Gthr.

Jalor.

This is an addition to the herpetological fauna of the Malay Peninsula, the species being previously known from Southern China and Siam.

**45. *Lygosoma praesigne*, Blgr.**

Semangko Pass, Selangor-Pahang border.

The single specimen agrees very closely in size, scaling, and coloration, with the type from the Larut Hills, altitude, 4,000 feet, which I described in the *Annals and Magazine of Natural History* (7) vi, 1900, p. 191.

'The specimen was captured in a crevice in a tree-trunk, and many others were noted in the vicinity, which I neglected to secure, mistaking them for the immature stage of the common *Mabuia multifasciata*, to which *L. praesigne* bears a strong superficial resemblance.' H. C. R.

**46. *Lygosoma bowringii*, Stwr.**

Jambu, Jhering.

'The specimen was taken at dusk, on a sandy path. It progressed, rather slowly, by movements of the body, the limbs giving, apparently, very little aid.'

**47. *Lygosoma quadrivittatum*, Ptrs.**

Bukit Besar.

This skink was known from Celebes (Gorontalo) and the Philippines (Mindanaor); the British Museum has received it from Sandakan, North Borneo; and its range is now found to extend to the Malay Peninsula.

**48. *Lygosoma chalcides*, L.**

Batang Padang, South Perak.

'The limbs of this and similar slender forms are of more use in progression than their small size would indicate, at any rate upon the surface of the ground. The species are, however, burrowing forms, so often found associated with the Typhlopidae that the Malays regard them as the larvae of these snakes.'

**49. *Lygosoma miodactylum*, sp. nov.**

(Plate X, Fig. 3)

Section *Lygosoma*. Body much elongated, limbs minute, the anterior with toes rudimentary, bud-like digits with blunt claws; the posterior terminating in a single sharp claw. Snout short, obtuse; lower eyelids scaly, nostril pierced in the anterior lower part of the nasal; no supranasal; fronto-nasal twice as broad as long, forming sutures with the rostral and with the frontal;

praefrontals small ; frontal slightly longer than broad, broader than the supra-ocular region, in contact with the first and second supraoculars ; four supraoculars, six superciliaries ; fronto-parietals distinct ; interparietal longer than the fronto-parietals ; parietals forming a suture behind the interparietal ; first upper labials largest, fourth entering the orbit ; ear completely hidden ; twenty-two smooth scales round the middle of the body, equal ; a pair of enlarged praeanales ; tail thick, dark-brown above, white beneath, sides white with longitudinal series of brown spots corresponding to the scales.

Total length, 152 mm. ; head, 11 mm. ; width of head, 7 mm. ; fore limb, 4 mm. ; hind limb, 6 mm. ; tail (regenerated), 65 mm.

A single specimen from Semangko Pass, Selangor-Pahang boundary. 2,700 feet.

Very closely allied to *L. larutense*, Blgr.,<sup>1</sup> from Larut, Perak (3,000 to 4,000 feet). Distinguished by the monodactyle hind limb, and the smaller number of scales round the body, viz., twenty-two instead of twenty-six.

## DIBAMIDAE

### 50. *Dibamus novae-guineae*, D. & B.

An embryo from Bukit Besar.

New to the Malay Peninsula. Known from New Guinea, the Moluccas, Lombok, Celebes, Sumatra, and the Nicobars.

'The egg, which was found by a native in a dead tree-trunk, was broad in proportion to its length, but not circular ; it had a brittle and highly calcareous shell.'

## OPHIDIA

### TYPHLOPIDAE

#### 51. *Typhlops braminus*, Daud.

Bukit Besar and Selangor.

#### 52. *Typhlops nigroalbus*, D. & B.

Bukit Besar, Sai Kau, and Jalor.

'The distribution of the Typhlopidae in the State of Jalor is somewhat sporadic, but appears to coincide with that of burrowing lizards, such as *Lygosoma chalcides*, and of the burrowing Amphibian, *Ichthyophis glutinosus*. For instance, these forms are exceedingly rare, if they occur at all, in the

1. *Ann. and Mag. N. H.* (7) v, 1900, p. 306.

immediate vicinity of Biserat ; while they are all abundant at the villages of Mata Rusa and Parang, which are four or five miles distant across the rice fields, and which stand in large and ancient orchards. The Malays, who delight in zoological theorizing, say that the "earth snakes" avoid the banks of the river because they are afraid of some particular ant, which is abundant there. This theory may be the correct one, but to myself, who have not had the opportunities of observation enjoyed by the natives, it seems more probably that they avoid a sandy soil, in which there are few earthworms, and prefer a rich leaf-mould in which earthworms abound.'

### BOIDAE

#### 53. *Python reticulatus*, Schn.

Batang Padang and Jalor.

Not uncommon in the Patani States and Lower Siam. The Malays have many superstitions regarding it.<sup>1</sup>

### COLUBRIDAE

#### 54. *Chrysydrus granulatus*, Schn.

Patani.

#### 55. *Tropidonotus piscator*, Schn.

Jalor.

#### 56. *Tropidonotus chrysargus*, Schlg.

Bukit Besar and Jalor.

'Two specimens were captured in pools of water in a tree-trunk, feeding on the spawn of the frog *Ixalus horridus*.'

#### 57. *Macropisthodon rhodomelas*, Boie.

Batang Padang.

#### 58. *Lycodon laoensis*, Gthr.

Jalor.

Was only known from Siam until discovered at Kota Bharu (Rhaman) by the 'Skeat' Expedition.

1. *Fascic. Malay., Anthropol.*, part 1, p. 88. See also Skeat's *Malay Magic*, pp. 302, 303

**59. Zamenis korros**, Schlg.

Jalor.

' A very common snake in Jalor and Nawngchik, generally being found in or near brushwood. The Malays call it the "wild snake" (*ular liar*) on account of its vicious behaviour when captured. At Biserat a native brought us a male and female which he had taken paired. The male, which had evidently lost the tip of his tail, measured 174 cm., and the female 202 cm. in length. Both these specimens had the ventral surface of the neck of a bright chrome yellow, which was more intense in the male than the female. This brilliant colour is usually absent, and is probably assumed only at the breeding season. The large, black-edged scales of the tail of this species give large specimens a rather close resemblance to the Hamadryad (*Naia bungarus*) which has often an orange patch of considerable size on its throat. Consequently, the Malays often confuse the two species, the harmless with the venomous, and call large specimens of the former by the name that properly belongs to the latter.

' A very large specimen, measuring 2,505 mm. in length, was brought us at Kampong Jalor, and was more variegated in coloration than were the smaller specimens commonly seen. Its general colour above was dark fuscous, with mesial and lateral black lines, joined by black cross-bars. The ventral surface was cream, vermiculated with slaty black, the sides of the scales being very dark lead-grey. The tail was almost entirely of the latter shade beneath; above it had a diamond-shaped pattern of black on a dark fuscous ground. The skin between the scales was pale yellow, producing zigzag markings along the sides. This specimen deceived not only the natives of the village, but also ourselves. We were about to start on a journey and merely examined the colour of the specimen, never doubting but that it was one of *Naia bungarus*.'

**60. Coluber taeniurus**, Cope

Goah Tanah, near Biserat, Jalor; and Batu Caves, near Kuala Lumpur, Selangor.

The large specimen from Jalor agrees with the definition of the var. *ridleyi*, BUTLER,<sup>1</sup> whilst the smaller specimen (97 cm.) from the Batu Caves is of a generally darker colour and shews faint traces of a reticulate pattern on the middle part of the body, whilst the dorso-lateral stripe is intensely black on the posterior part of the body and on the tail.

' This snake, which is called by the Malays of Selangor and Patani "moon snake" (*ular bulan*), is not so common in the Jalor caves as in those near Kuala

1. *Journ. Bomb. Soc. N. H.* xii, 1899, p. 426.

Lumpur. In both localities its food consists entirely or principally of bats.<sup>1</sup> The sound it produces when disturbed is most peculiar, in no way resembling a hiss, but rather, as I find it described in my notebook, being midway between a mew and a squeal. The snake is usually found in the darkest parts of the cave, but though it seems dazed and purblind when suddenly brought out into a bright light, it soon regains normal vision. The difference between the young specimen and a much larger one, of the *ridleyi* variety, taken the same day as that on which we took the former, and within a few yards of its place of capture, was, perhaps, more marked in life than it would have been in preserved specimens, and the fact that the *ridleyi* variety departs further from the normal coloration of the species, makes it most improbable that the superior intensity of the pigmentation of the smaller individual was merely a juvenile livery. Mr. BOULENGER points out, that no very young specimen of *Coluber taeniurus* has been recorded from the Malay caves, and that it is very possible, on the one hand, that if young specimens were kept in total darkness, they would, so to speak, fade into the variety *ridleyi*, and, on the other, that older specimens of this variety, if kept in daylight, might possibly become darker and assume the typical markings of COPE's species; and the living specimens we have seen bear out this view. It is strange, however, how extremely rare specimens of *Coluber taeniurus* appear to be in the Malay Peninsula, except in the caves, in some of which they are quite abundant.'

**61. *Coluber radiatus*, Schlg.**

Jalor.

'This is the "rat snake" (*ular tikus*) of the Patani Malays, in whose houses it not infrequently takes up its abode, feeding on rats and on the sparrows,<sup>2</sup> which nest in the roofs of the larger buildings.'

**62. *Dendrophis pictus*, Gmel.**

Jalor.

'Probably the most abundant snake in the cultivated parts of the Patani States, where it is called *ular lidi*, that is, "midrib of the cocoanut-palm snake," a name the appropriateness of which is realized when one sees a leaf of this palm from below, with the midrib black against the sky, and an apparent light space on either side of it, due to the comparative narrowness of the leaflets where they leave it. The snake is generally found among bushes, often at the edge of rice fields.'

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1. S. Flower, *Proc. Zool. Soc.* 1899, p. 668

2. *Passer montanus*.

**63. Calamaria pavimentata**, D. & B.

Jalor, Sai Kau (Nawangchik), and Batang Padang (South Perak).

The black line along the lower surface of the tail may be absent.

'Not uncommon among the rubbish under native houses in the Patani States, where small specimens are sometimes called *ular lima kendiri*, "five kendiri snakes," a *kendiri* being three cents, or considerably less than a penny. This curious name is given them because it is believed that the effects of their bite can be remedied for medicine worth fifteen cents.'

**64. Hypsirhina plumbea**, Boie.

Jalor.

'Essentially aquatic, but often found under dead trees some distance from water. On Cape Patani it is common in the freshwater pools, on the bottom of which it may often be seen, lying stretched out almost straight.'

**65. Hypsirhina bocourtii**, Jan.

Jalor.

'Often found with *Acrochordus javanicus* in swamps and pools. The superior brilliance of coloration of young specimens is remarkable.'

**66. Dipsadormorphus dendrophilus**, Boie.

Jalor.

The specimens belong to the var. *melanotus* of BLEEKER.

'This nocturnal snake is very vicious, and drums with its tail on the ground when alarmed, but its food consists of small mammals, frogs, lizards, other snakes, fish, and, curiously enough, slugs.'

**67. Dipsadomorphus cynodon**, Boie.

Jalor.

'The specimen was taken coiled up on a bush about four feet above the ground. Unlike all the specimens of *D. dendrophilus* which I have seen in life, it was sluggish in demeanour, and made little attempt to escape, though it had evidently not had a recent meal.'

**68. Dipsadomorphus pallidus**, sp. nov.

Anterior palatine and mandibular teeth enlarged, but less than in *D. cynodon*. Rostral broader than deep, well visible from above, internasals

broader than long, shorter than the praefrontals ; frontal as long as broad, as long as the distance from the end of the snout, shorter than parietals ; loreal tapezoid, longer than deep ; one praecular, in contact with the frontal ; two postoculars, in contact with the frontal ; temporals 2 + 3 ; eight upper labials, third, fourth, and fifth entering the eye ; four or five lower labials in contact

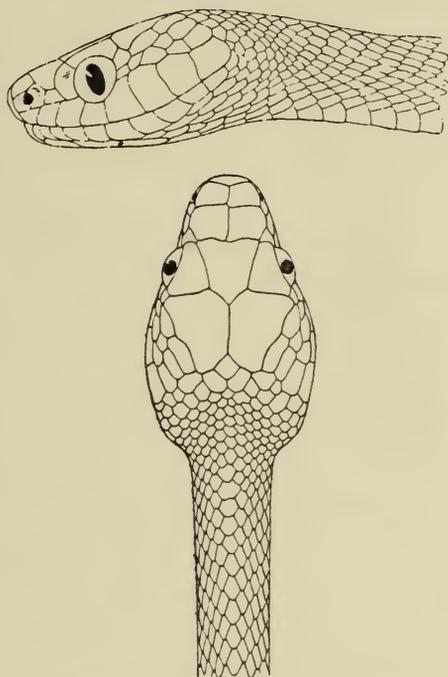


FIG. 3. Head of *Dipsadomorphus pallidus*. Two-thirds natural size.

with the anterior chin-shields, which are smaller than the posterior. Scales in twenty-one rows, vertebral row strongly enlarged. Ventrals, 256 mm. ; anal, entire ; subcaudals, 154 mm. Head and neck purplish-grey above, fading into a pale brown on the body ; no spots or markings of any kind ; upper lip and lower parts yellowish-white ; belly and tail speckled with grey. Total length, 1,580 mm. ; tail, 420 mm.

A single female specimen from Jalor.

**69. Psammodynastes pulverulentus**, Boie.

Jalor.

**70. Dryophis prasinus**, Boie.

Patani, Bukit Besar, and Jalor.

‘Common throughout the Patani States, equally so in virgin jungle at 3,000 feet, and in the open casuarina woods on Cape Patani. It

feeds chiefly on skinks. On Bukit Besar, we watched a large specimen on the look-out for prey. It had its tail and the posterior half of its body coiled among the branches of a small shrub growing among long grass, while the anterior half of its body stretched outwards without support, the neck being arched. This position was retained for some minutes, and then an abrupt movement changed the direction of the head and neck, without an alteration in the position of the tail and that part of the body coiled in the shrub. The same movement was repeated at intervals, so that the snake viewed all quarters in turn. When annoyed, *D. prasinus* puffs out its slender neck so that it attains a girth approximately equal to that of the body, and by so doing causes the skin to be stretched and the black and blue-grey markings between the scales to be displayed. The three colour-varieties, the commonest of which has in life the general colour of the dorsal surface a bright leaf-green, while the others have it emerald green and golden brown respectively, are found together in the Patani States, and the difference in their appearance does not appear to be due either to age, to sex, or to environment.'

**71. *Chrysopelea ornata*, Shaw**

Jalor.

'Also a common species in the Patani States, Senggora, Patalung, and Trang, frequently entering native houses and lodging in the roof. The commonest coloration in these States is blackish, finely chequered and veined with greenish yellow. Individuals thus coloured are called *ular jelôtong* by the Malays of the Patani States, *jelôtong*, the colour of the *lôtong* monkey, *Presbytes (Semnopithecus) obscurus*, being a dark slaty grey. When a specimen has scarlet and black spots on the sides, it is called *ular batu daching*, or "balance-weight snake," because these spots resemble the little scarlet and black "crabs' eye" seeds, used as weights in the Malay goldsmiths' scales.'

**72. *Thalassophis annandalii*, Laidlaw**

*Distira annandalii*, *Laidlaw, P.Z.S.*, 1901, ii, p. 579, pl. xxxv.

Head moderate, body short and stout, strongly compressed behind the neck. Rostral broader than deep; nasals small, separated by a pair of large internasals, which widen in front, upper head shields more or less broken up, the parietals small and separated from each other, and sometimes also from the frontal, by very small scales; frontal and supraocular unusually large, well developed, eye separated from the upper labials by one or two suboculars, one or two prae-, and one or two postoculars; temporal scales small, numerous;

nine to twelve upper labials, chin-shields usually broken up into scales. Scales extremely small, ninety to one hundred round the middle of the body, juxtaposed, dorsals with a more or less distinct central tubercle or short keel. Ventrals, 350-370 mm., very feebly enlarged. Pale greyish olive above, white below; back with dark cross-bars, narrower than the interspaces, tapering to a point on the sides.

Total length, 600 mm. ; Tail, 80 mm ; Greatest depth of body, 43 mm.

Several specimens from Patani.

This is a very remarkable sea snake, distinguished from all other Hydrophinae by its extremely small scales. As the nasal shields are distinct from the internasals, it is better placed in *Tbalassophis* than in *Distira*, if, however, the former deserves to rank as a valid genus.

**73. *Hydrophis caeruleus*, Shaw**

Patani.

**74. *Distira wrayi*, Blgr.**

Patani.

**75. *Distira jerdonii*, Gray**

Patani.

**76. *Enhydris hardwickii*, Gray**

Patani.

**77. *Enhydris valakadien*, Boie.**

Patani.

‘This appears to be by far the commonest species in Patani Bay, in the shallow and muddy waters of which sea snakes literally swarm, while they appear to be very little less common in the open sea on the other side of Cape Patani. A very large proportion of the fish on which they feed in the bay are Silurids and others provided with long, sharp spines, and the manner in which these spines are eliminated from the snakes’ bodies is curious, for they appear to pass out through the walls of the alimentary canal and through the body wall to the exterior. I have frequently found specimens of the Hydrophinae with fish spines actually protruding from within through the integument, without, apparently, causing any inflammation or inconvenience. Sea snakes cannot hiss, but produce a low gurgling sound when annoyed. During the fishing season at Patani, in the spring and summer months, they are comparatively harmless, being inoffensive except when injured, and never, it is said, biting men wading in the sea with their nets ; but during the north-east monsoon, in November, December,

and January, when a tremendous surf breaks all along the shore and practically blocks up the mouths of the rivers, the sea snakes, battered in the waves, often cast up on the beach torn and wounded, naturally lose their temper, and bite anything in contact with which they come. We have seen them in this condition, and can well believe, as we were told, that several deaths are annually caused by their bites among the fishermen of every little community by the sea, who take the opportunity to go out shrimping whenever a break in the weather occurs. It is said, too, that numbers of the snakes are shut up in the river mouth, where they have taken refuge from the storm, and that when in fresh or brackish water their bite is most dangerous. The Malays say that when a person is bitten blood starts out from his eyes and ears, and he dies in high fever within twenty-four hours.'

**78. *Naia tripudians*, Merr.**

Jalor. Belongs to the var. *fasciata*, Gray.

'The cobra is rare throughout the Patani States, but is said to be more abundant on Cape Patani than elsewhere. We could not hear of a single death from its bite. The only specimen which we saw in nine months, except the specimen preserved, belonged to the same variety, and was brought to us at Sai Kau. A very beautiful variety of an almost uniform yellowish colour, known to the Malays as "turmeric ladle-hood snake" (*ular tedong sendok kunyit*), is, apparently, not very uncommon in Rhaman, where, in 1899, I saw two specimens in one day.'

At Kuala Lumpur, cobras were very common, and numerous specimens were brought to me at the Museum. They belonged without exception to the black variety, *N. sputatrix*, BOIE, which is the prevalent form in the southern half of the Peninsula.

**79. *Naia bungarus*, Schleg.**

Ban Sai Kau, Nawngchik.

'General colour fuscous, some of the scales with a yellow base; skin of the neck irregularly blotched with black and yellow; top of the head sienna brown; under surface dirty white, with a fuscous bar on the neck followed by a patch of dull orange; scales on the tail paler in colour and broadly edged with black. Total length, 3,317 mm.'

'The Hamadryad seems to be commoner in the Patani States than the cobra, but the specimen preserved was the only one examined, and it is very easy to confuse with it a large specimen of *Zamenis korros* hastily seen. Our specimen was shot by Mr. ROBINSON, under a native house in the

village of Sai Kau. It had taken refuge in a pile of cocoanuts, from which it was persuaded to come out by a Chinaman armed with a long pole; it attempted to crawl away, making no movement in our direction, though we were within a few yards of it. This was said to be the same individual which had bitten a man on the shin a day or two previously. According to this man's own story, he had been passing along a path close to the house under which the specimen was shot, when an "*ular selor*, as big as a cat," leaped out from behind a log and bit him. We were asked to see him the next day, and found him apparently dying of pain and fright; his leg was tremendously swollen but not above the knee, and had a slightly bluish tinge, and he felt pain in the glands under the arm-pits and elsewhere. We applied such remedies as we were able, and, what was more important, persuaded him and his friends that we could cure him. When we left Sai Kau, a week later, he was well on the way to recovery. I have described this incident, because I think that there is strong circumstantial evidence that the man actually had been bitten by a Hamadryad. It was certain that he had been bitten by a large poisonous snake, for the marks of the fangs, which were just visible, were far apart. I do not know of any poisonous snake "as big as a cat," except a Hamadryad or a large cobra, for the Malays gauge the size of an animal by its girth, rather than its length or height, and the bite was rather high on the limb for it to have been that of a species that lies on the ground like *Ancistrodon rhodostoma*. It is not at all improbable that poisonous snakes<sup>1</sup> are less deadly in the Malay Peninsula than the representatives of the same species in India, except, perhaps, the Hydrophinae.'

**80. *Callophis gracillis*, Gray**

Batang Padang, South Perak.

**81. *Doliophis bivirgatus*, Boie.**

Jalor. The typical form.

**82. *Doliophis intestinalis*, Laur.**

Bukit Besar and Batang Patang (vars. *annectens*, Belgr. ; and *lineata*, Gray).

'The Malays of Patani say that both *D. bivirgatus* and *D. intestinalis*, which share the name of "sunbeam snake" (*ular sina mata-bari*), frequently progress with the bright coral-red part of their tails held upright, apparently in very much the same manner as *Cylindrophis rufus*, as figured by Captain

1. The proper Malay name of this snake is *ular selor*, and it is through a mistake of my own that it is called *ular telor* (egg snake), in Mr. Laidlaw's report on the snakes of the 'Skeat' Expedition. N. A.

FLOWER.<sup>1</sup> Moreover, they assert that all red-tailed snakes are very poisonous, believing that the "sunbeam snakes" flourish their tails in the air as an advertisement of the fact. It is probable that the observation that they flourish their tails is a true one, but it is very doubtful whether the species of *Doliophis* can be reckoned, practically, as dangerous forms, in spite of the enormous size of the poison glands in *D. bivirgatus*. *Cylindrophis rufus* is a most inoffensive and feeble snake, and many specimens are devoid of the red mark on the tail; indeed, it is probable that the whole theory of warning coloration, as far as the Patani Malays are concerned, rests on the fact that the readiest way of distinguishing between the venomous *Lachesis gramineus* and the harmless *Dryophis prasinus*, when the shape of the head cannot be seen, is the reddish tail of the former species.'

### AMBLYCEPHALIDAE

#### 83. *Haplopeltura boa*, Boie.

Bukit Besar, 2,000 feet.

'A specimen was taken lying almost straight along the midrib of the leaf of a small palm in the jungle. The whole coloration and attitude suggested a stick that had fallen from above, and the blunt snout and buff markings on the head appeared to represent that part of the stick which had been broken from its parent branch.'

#### 84. *Amblycephalus moellendorffii*, Bttg.

Jalor.

### VIPERIDAE

#### 85. *Ancistrodon rhodostoma*, Boie.

Jalor.

This large and deadly Crotaline snake was only recorded with certainty from Java, and with doubt from Siam. I have, however, been recently shown a specimen from Puket,<sup>2</sup> Siam, received by the Christiania Zoological Museum. The distribution is the same as that of the Chelonian *Damonia subtrijuga*.

'*A. rhodostoma* cannot be scarce in the neighbourhood of Biserat and K. Jalor, as several specimens, of which we did not keep all, were brought us at both of these places. The Jalor Malays call it *ular kapak daun*, or "leaf axe-

1 P.Z.S., 1899, pl. XXXVII.

2. Puket is the chief place in the Siamese island of Junk Ceylon or Selangka, which lies off the west coast of the Malay Peninsula, south of the Isthmus of Kra. N. A.

snake," but, as Mr. LAIDLAW<sup>1</sup> has pointed out, the term *ular kapak* is of wide application, while the present species certainly shares the name of "leaf axe-snake" with *Lachesis gramineus*, and probably with other forms that resemble leaves living or dead. The persons who brought us specimens of *Ancistrodon rhodostoma* denied that its bite was fatal, though they said that it made a man very ill. This is curious, as peasants, whether British or Malay, have usually a tendency to exaggerate the dangerous qualities of animals with which they are liable to come in contact, and I do not think there was any superstitious reason<sup>2</sup> why they should speak no ill of this snake, for I asked them, on several occasions, after the specimen was dead and in spirit. They say that the "leaf axe-snake" lies about among dead leaves and is very sluggish, as its figure would suggest.'

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## APPENDIX

### LIST OF THE BATRACHIANS AND REPTILES RECORDED FROM THE MALAY PENINSULA, SOUTH OF TENASSERIM

NUMEROUS additions have been made to our knowledge of the Batrachians and Reptiles of the Malay Peninsula, since the publication of Capt. S. S. FLOWER's useful list in the *Proceedings of the Zoological Society* in 1896 (p. 856). A second list given by Capt. FLOWER, in 1899 (pp. 600 and 885), is obscured by the fact that Siam is included. I therefore gladly fall in with the suggestion that a complete list should now be given, embodying the additions made by the 'Skeat' Expedition, the reptiles of which were described by Mr. F. F. LAIDLAW (*Proc. Zool. Soc.* 1900, p. 883, and 1901, i, p. 301, and ii, p. 575); and by the collections of Messrs. L. WRAY and A. L. BUTLER, and described by me (*Ann. Mag. N. H.* (7) v, 1900), and *Journ. Bomb. N. H. Soc.* xiii, p. 333 (1900), or listed by Mr. BUTLER (*Proc. Zool. Soc.* 1902, ii, p. 188).

In this list the names of species not in Capt. FLOWER's list of 1899 are marked with an asterisk (\*).

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1. *Proc. Zool. Soc.* 1901 (2), p. 576.

2. Cf. *Fascic. Malay. Anthropol.*, part I., pp. 83, 104.i



## REPTILIA

## CHELONIA

## Sphargdiae

1. *Dermochelys coriacea*, Linn.

## Testudinidae

- |   |   |
|---|---|
| 2. <i>Callagur picta</i> , Gray.                                | *9. <i>Cyclemys annandalii</i> , Blgr. Supra p. 142 |
| 3. <i>Batagur baska</i> , Gray.                                 | 10. „ <i>dhor</i> , Gray.                           |
| 4. <i>Hardella thurgi</i> , Gray.                               | 11. <i>Geomyda spinosa</i> , Gray.                  |
| *5. <i>Damonia subtrijuga</i> , Schleg. & Müll.<br>Supra p. 142 | 12. „ <i>grandis</i> , Gray.                        |
| 6. <i>Bellia crassicollis</i> , Gray.                           | 13. <i>Testudo emys</i> , Schleg. & Müll.           |
| 7. <i>Cyclemys amboinensis</i> , Daud.                          | *14. „ <i>pseudemys</i> , Blgr. Supra p. 144        |
| 8. <i>Cyclemys platynota</i> , Gray.                            | 15. „ <i>elongata</i> , Blyth.                      |

## Chelonidae

- |   |                                      |
|---|--------------------------------------|
| 16. <i>Chelone mydas</i> , Linn.          | 17. <i>Chelone imbricata</i> , Linn. |
| 18. <i>Thalassochelys caretta</i> , Linn. |                                      |

## Trionychidae

- |  |  |
|--|--|
| 19. <i>Trionyx subplanus</i> , Geoffr. | 22. <i>Trionyx cartilagineus</i> , Bodd. |
| 20. „ <i>hurum</i> , Gray.             | 23. <i>Pelochelys cantori</i> , Gray.    |
| 21. „ <i>phayrii</i> , Gray.           |  |

## EMYDOSAURIA

## Crocodilidae

- |  |                                       |
|--|---------------------------------------|
| 24. <i>Tomistoma schlegelii</i> , S. Müll. | 25. <i>Crocodylus porosus</i> , Schn. |
| 26. <i>Crocodylus palustris</i> , Less.    |                                       |

## LACERTILIA

## Geckonidae

- |   |   |
|---|---|
| 27. <i>Gymnodactylus marmoratus</i> , Kuhl.             | 39. <i>Hemidactylus platyurus</i> , Schn.                               |
| *28. „ <i>peguensis</i> , Blgr.<br>Patalung (Laidlaw).  | 40. <i>Mimetoazon craspedotus</i> , Mocq.                               |
| 29. „ <i>pulchellus</i> , Gray.                         | 41. <i>Gehyra mutilata</i> , Wiegman.                                   |
| 30. <i>Gonatodes kendalli</i> , Gray.                   | *42. „ <i>larutensis</i> , Blgr.<br>Larut, Perak (A. L. Butler).        |
| 31. „ <i>affinis</i> , Stol.                            | *43. „ <i>butleri</i> , Blgr.<br>Kuala Lumpur, Selangor (A. L. Butler). |
| 32. <i>Aeluroscalobates felinus</i> , Gthr.             | 44. <i>Lepidodactylus ceylonensis</i> , Blgr.                           |
| 33. <i>Hemidactylus frenatus</i> , Schleg.              | 45. „ <i>lugubris</i> , D. & B.   |
| 34. „ <i>brookii</i> , Gray.                            | 46. <i>Gecko verticillatus</i> , Lawr.                                  |
| 35. „ <i>depressus</i> , Gray.                          | 47. „ <i>stentor</i> , Cantor.  |
| 36. „ <i>leschenaultii</i> , D. & B.                    | 48. „ <i>monarchus</i> , Schleg.  |
| 37. „ <i>flaviviridis</i> , Rüpp.<br>(coctaei, D. & B.) | 49. <i>Ptychozoon homalocephalum</i> , Crev.                            |
| 38. „ <i>garnoti</i> , D. & B.                          | 50. „ <i>horsfieldii</i> , Gray.  |

## Agamidae

- |   |   |
|---|---|
| 51. <i>Draco volans</i> , Linn.   | 59. <i>Draco quinquefasciatus</i> , Gray.         |
| 52. „ <i>maculatus</i> , Cantor.  | 60. <i>Aphianotis fusca</i> , Ptrs.               |
| 53. „ <i>fimbriatus</i> , Kuhl.   | 61. <i>Gonyocephalus herveyi</i> , Blgr.          |
| *54. „ <i>punctatus</i> , Blgr. Larut, Perak<br>(A. L. Butler). Supra p. 151  | 62. „ <i>borneensis</i> , Schleg.                 |
| *55. „ <i>formosus</i> , Blgr. Larut, Perak<br>(A. L. Butler). Supra p. 152   | 63. „ <i>grandis</i> , Gray.                      |
| *56. „ <i>blanfordii</i> , Blgr. Larut, Perak<br>(A. L. Butler). Supra p. 153 | 64. <i>Acanthosaura armata</i> , Gray.            |
| *57. „ <i>microlepis</i> , Blgr. Larut, Perak<br>(A. L. Butler).              | 65. <i>Calotes cristatellus</i> , Kuhl.           |
| 58. „ <i>melanopogon</i> , Blgr.  | 66. „ <i>versicolor</i> , Daud.                   |
|   | *67. „ <i>emma</i> , Gray. Patalung<br>(Laidlaw). |
|   | 68. <i>Liolepis bellii</i> , Gray.                |

## Varanidae

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| 69. <i>Varanus flavescens</i> , Gray. | 71. <i>Varanus rudicollis</i> , Gray. |
| 70. „ <i>nebulosus</i> , Gray.        | 72. „ <i>salvator</i> , Laur.         |

## Lacertidae

- \*73. *Tachydromus sexlineatus*, Daud. Biserat, (Laidlaw).

## Scincidae

- |   |  |
|---|--|
| 74. <i>Mabuia novemcarinata</i> . And.  | 85. <i>Lygosoma anomalopus</i> , Blgr.                                   |
| 75. „ <i>macularia</i> , Blyth.   | 86. „ <i>olivaceum</i> , Gray.   |
| 76. „ <i>rugifera</i> , Blgr.   | 87. „ <i>atrocostatum</i> , Less.  |
| 77. „ <i>multifasciata</i> , Kuhl.  | 88. „ <i>singaporensis</i> , Sldr.                                       |
| *78. „ <i>siamensis</i> , Gthr. Supra p. 158                                      | *89. „ <i>bampfyldii</i> , E. Bartl.<br>Larut, Perak (A. L. Butler).     |
| *79. <i>Lygosoma stellatum</i> , Blgr. Larut, Perak<br>(S. Flower, A. L. Butler). | 90. „ <i>bowringii</i> , Gthr.   |
| *80. „ <i>praesigne</i> , Blgr. Larut, Perak<br>(A. L. Butler).                   | 91. „ <i>albopunctatum</i> , Gray.                                       |
| *81. „ <i>scotophilum</i> , Blgr. Batu caves,<br>Selangor (A. L. Butler).         | *92. „ <i>quadrivittatum</i> , Ptrs.<br>Supra p. 159                     |
| *82. „ <i>malayanum</i> , Doria. Larut,<br>Perak (A. L. Butler).                  | *93. „ <i>surdum</i> , Blgr. Selangor<br>(A. L. Butler).                 |
| *83. „ <i>floweri</i> , Laidlaw. Gunung<br>Inas, Perak (Laidlaw).                 | 94. „ <i>chalcides</i> , Linn.   |
| 84. <i>Lygosoma maculatum</i> , Blyth.  | *95. „ <i>larutense</i> , Blgr. Larut, Perak<br>(L. Wray, A. L. Butler). |
|   | *96. „ <i>niodactylum</i> , Blgr. Supra p. 159                           |

## Dibamidae

- \*97. *Dibamus novae-guineae*, Blgr. Supra p. 160

## OPHIDIA

## Typhlopidae

- |   |  |
|---|--|
| 98. <i>Typhlops lineatus</i> , Boie.                            | 101. <i>Typhlops bothriorhynchus</i> , Gthr. |
| 99. „ <i>braminus</i> , Daud.                                   | 102. „ <i>nigroalbus</i> , D. & B.           |
| *100. „ <i>albiceps</i> , Blgr. Larut, Perak<br>(A. L. Butler). |  |



## Colubridae—continued

- |  |  |
|--|--|
| 179. <i>Psammodynastes pulverulentus</i> , Boie.                     | *198. <i>Distira wrayi</i> , Blgr. Perak Coast<br>(L. Wray). Patani (Laidlaw). |
| 180. <i>Dryophis xanthozona</i> , Boie.                              | 199. „ <i>cyanocincta</i> , Daud.  |
| 181. „ <i>prasinus</i> , Boie.                                       | 200. „ <i>jerdoni</i> , Gray.  |
| 182. <i>Dryophiops rubescens</i> , Gray.                             | *201. <i>Enhydris curtus</i> , Shaw.<br>Patani (Laidlaw).                      |
| 183. <i>Chrysopetea ornata</i> , Shaw.                               | 202. „ <i>hardwickii</i> , Gray.   |
| 184. „ <i>chrysochlora</i> , Boie.                                   | 203. <i>Enhydrina valakadien</i> , Boie.                                       |
| 185. <i>Hydrus platurus</i> , Linn.                                  | 204. <i>Aipysurus eydouxi</i> , Gray.  |
| *186. <i>Thalassophis annandalii</i> , Laidlaw.<br>Patani (Laidlaw). | 205. <i>Platurus laticaudatus</i> , Linn.                                      |
| 187. <i>Hydrophis caeruleus</i> , Shaw.                              | 206. „ <i>colubrinus</i> , Schn.   |
| 188. „ <i>nigrocinctus</i> , Daud.                                   | 207. „ <i>fasciatus</i> , Schn.  |
| 189. „ <i>gracilis</i> , Shaw.                                       | 208. „ <i>candidus</i> , Linn.   |
| 190. „ <i>cantori</i> , Gthr.  | 209. <i>Bungarus flaviceps</i> , Reinw.  |
| 191. „ <i>fasciatus</i> , Schn.                                      | 210. <i>Naia tripudians</i> , Merr.  |
| *192. „ <i>rhombifer</i> , Blgr.<br>Coast of Perak (L. Wray).        | 211. „ <i>bungarus</i> , Schleg.   |
| 193. „ <i>torquatus</i> , Gthr.                                      | 212. <i>Callophis gracilis</i> , Gray.   |
| 194. „ <i>obscurus</i> , Daud.                                       | 213. „ <i>maculiceps</i> , Gthr.   |
| 195. <i>Distira stokesii</i> , Gray.                                 | 214. <i>Doliophis bivirgatus</i> , Boie.                                       |
| 196. „ <i>ornata</i> , Gray.   | 215. „ <i>intestinalis</i> , Laur.   |
| 197. „ <i>brugmansii</i> , Boie.                                     |  |

## Amblycephalidae

- |  |   |
|--|---|
| 216. <i>Haplopeltura boa</i> , Boie.   | 218. <i>Amblycephalus laevis</i> , Boie.                            |
| *217. <i>Amblycephalus vertebralis</i> , Blgr.<br>Larut, Perak (A. L. Butler). | 219. „ <i>malaccanus</i> , Boie.                                    |
|  | *220. „ <i>moellendorffii</i> , Bttgr.<br>Biserat, Jalor (Laidlaw). |

## Viperidae

- |  |  |
|--|--|
| *221. <i>Ancistrodon rhodostoma</i> , Boie.<br>Supra p. 170. | 224. <i>Lachesis gramineus</i> , Shaw. |
| 222. <i>Lachesis monticola</i> , Gthr.                       | 225. „ <i>sumatranus</i> , Raffles.    |
| 223. „ <i>purpureomaculatus</i> , Gray.                      | 226. „ <i>wagleri</i> , Boie.          |

CICENDELIDAE

BY  
HERBERT C. ROBINSON



## REPORT ON THE TIGER BEETLES (CICENDELIDAE)

BY HERBERT C. ROBINSON

AS Mr. RIDLEY has observed in a recent paper in the proceedings of the Straits Branch of the Royal Asiatic Society, the Tiger Beetles of the Malay Peninsula fall very readily into two divisions—(1) those which, like our European species, are essentially denizens of open country or of the seashore, and (2) those which are exclusively found in deep jungle. To the latter section great interest attaches, for they act as models, which are imitated by large numbers of other insects, more especially by beetles of other families and by Orthoptera.

The specimens in our collection have been identified by comparison with the series at the British Museum, which has been recently examined by Dr. HORN, but in the case of the difficult genus *Collyris* I cannot be absolutely certain of my identification, as in several instances I have had only a single specimen: in this connexion I must express my thanks to Messrs. GAHAN and ARROW, who have always been ready to assist me in every possible way.

### 1. *Cicendela aurulenta*, Fabr.

This wide-spread species was common everywhere in open country in the Siamese Malay States, from sea level—though its place was taken on the shore by *C. sumatrensis*—to 3,000 feet, but we did not ourselves meet with it in Perak or Selangor. In habits, it exactly agrees with those of *C. campestris*, being found running with great rapidity along roads or on patches of damp or dry sand, often in the hottest sunshine, and readily making use of its wings when disturbed. The mode of flight and the dense white pubescence on the lower surface give the insect a close resemblance to certain of the smaller wasps, which it resembles also in the buzzing sound it produces when handled.

‘Its variegated colour, however, renders it inconspicuous in broken light, when on sand strewn with scattered leaves and twigs.’ N. A.

**2. *Cicendela fuliginosa*, Dej.**

Biserat, Jalor. 18th October, 1901.

The single specimen in the collection was brought in by native children among specimens of the preceding species.

**3. *Cicendela sumatrensis*, Herbst.**

Cape Patani. June, October, 1901.

Found running about in great numbers just above high-water mark on the muddy shores of Patani Bay, and round the edges of freshwater pools on Cape Patani. Much scarcer on the seaward face of the same sand-spit, which, at one point, is not more than twenty or thirty yards wide, its place being seemingly taken by small crabs and by Diptera of different families.

**4. *Cicendela minuta*, Fabr.**

Sungkei, South Perak. 8th February, 1902. (At light).

**5. *Cicendela chlorochila*, Chaud.**

Ban Sai Kau, Nawngchik. 26th April, 1901. (At light).

**6. *Heptadonta analis*, Fabr.**

Semangko Pass, Selangor-Pahang boundary. 2,500-2,700 feet. May, 1902.

This brilliant species was found in great abundance on paths running through fairly open jungle. I only met with it in one locality, but it is common in Singapore and Penang.

**7. *Tricondyla aptera*, Oliv.**

Biserat, Jalor. 11th July, 1901.

Mr. RIDLEY remarks that this beetle has a superficial resemblance to the large ant, *Camponotus gigas*, which is known to the Malays as *semut gajah* (elephant ant).

'I took two specimens of this species running about together on sand at the foot of a tall tree in open country. Their resemblance to a fossorial wasp,<sup>1</sup> common in the same environment, was so marked that the Malays with me begged me not to touch them, remarking that wasps of that kind stung very badly. The wasp is frequently seen running about on sand, with its wings folded in such a way as to be very inconspicuous,

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1. *Sphex lobatus*, Fabr.

but at the same time to somewhat veil the brilliant iridescent blue of the abdomen. It never runs straight for any distance, being probably employed in hunting other insects, perhaps "ant lions," in the sand, but frequently stops for a moment, and then resumes motion in another direction. The beetle had exactly the same gait and movements, and its resemblance to the wasp was due to this rather than to any very detailed similarity of form or colour, though in these respects, too, there is a general likeness even in the set specimens. In the present instance, it would seem rather that the beetle mimicked the wasp than the wasp the beetle, the wasp being by far the commoner of the two insects, and also the more noxious. The bearing of Mr. RIDLEY's observation on this view is not clear, but, in any case, it is improbable that the resemblance between the Hymenopteron and the beetle was so close as in the instance observed by myself, for the movements of the ant referred to by Mr. RIDLEY bear a general likeness to those of the digging wasps, but are less rapid and abrupt, at any rate when the insects are undisturbed. The colour of the ant, moreover, is dark brown, instead of being metallic blue. Mr. SHELFORD<sup>1</sup> points out that in Borneo *Tricondyla cyanea* var. *wallacei*, a form resembling *T. aptera* in appearance, is mimicked in a very detailed manner by the Orthopteron *Condylodera tricondyloides*, which also mimics, in different stages of its growth, *T. gibba* and *C. sarawakensis*. It is very puzzling to find allied forms, of which some appear to act as models and others as mimics, but this would rather bear out Mr. ROBINSON's suggestion (*postea*, under *Collyris sarawakensis*) that in the case of these beetles and the forms which resemble them superficially we are dealing not with Batesian mimicry at all, but with a Müllerian association, some of the members of which may still be unknown. In considering a question of the kind it must be remembered that a large proportion of the insects reckoned scarce in collections are only "rare" because the particular habitat or locality in which they are abundant has not yet been discovered.' N. A.

#### 8. *Tricondyla wallacei* (Thoms.)

Bukit Besar, Nawngchik. 2,500 feet. 3rd September, 1901.

'Resting on end of twig in jungle; early morning.'

A single specimen is referred somewhat doubtfully to the above species.

#### 9. *Collyris apicalis*, Chaud.

Bukit Besar, Nawngchik. 2,500 feet. August, September, 1901.

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1. *Proc. Zool. Soc.* 1902 (2), pp. 233-234.

**10. *Collyris sarawakensis*, Thoms.**

Bukit Besar, Nawangchik. 2,500 feet. May, August, September, 1901.

This species and the preceding, which it closely resembles, were not uncommon on Bukit Besar. They frequented fairly open paths where there was much alternation of light and shade, and were extremely active and restless in their movements, settling for a few seconds on some projecting twig or leaf and then flying off with great rapidity. While on the wing they could with difficulty be distinguished from the smaller wasps of the family *Scoliidae* and from certain Diptera (*Sciomyzidae* ?), but this resemblance quite vanished when the beetles were at rest. Perhaps, however, the most interesting member of this mimetic association is a Heteromorous beetle, originally described by WESTWOOD as *Styrax tricondyloides*, and which appears to be exceedingly rare, as there is only a single specimen in the Bates collection at the British Museum. The single specimen that we captured, which we did not specially note at the time, was secured on Bukit Besar in the sweep net on April 20th, and so close was its resemblance to the three preceding species that it was actually taken down to the British Museum with the Cicindelids, and only recognized then on a rigid examination as not belonging to this family. Both it and its models have red legs and cyaneous elytra, which are strongly rugose at their anterior halves, while the posterior portion is smooth and shining, though in the case of *S. tricondyloides* it is slightly striated. The thorax of the mimic has two large tubercles on the disc, projecting slightly forwards as a kind of hump, with the result that the thorax appears to be slightly constricted anteriorly, as is the case in the species of *Collyris*.

It is not at first sight easy to understand why this section of the Cicindelids should be so very extensively mimicked' as they certainly are in the Eastern tropics. They are of course highly raptorial insects, but I am not aware that it has ever been shown that they are nauseous, while even if this was the case they are not, at any rate in the Malay Peninsula, sufficiently abundant for any protective qualities that they may possess to prove any advantage to their mimics. Possibly all cases in this group may ultimately be shown to be instances of Müllerian rather than Batesian mimicry, though the extreme rarity of the mimic is an argument against this supposition.

**11. *Collyris crassicornis*, Dej.**

Mabek, Jalor. 23rd July, 1901.

'Running on leaves of shrub, and flying rapidly from shrub to shrub.'

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1. Cf. R. Shelford, *Proc. Zool. Soc.* 1902 (2), pp. 233-234, pl. xix, figs. 1-6.

**12. Collyris filiformis**, Chaud.

Bukit Besar. 2,500 feet. April, May, 1901.

**13. Collyris variicornis**, Chaud.

Bukit Besar, Nawngchik. 2,500 feet. May, September, 1901.

**14. Collyris cribripennis**, Thoms.**15. Collyris fuscitarsis**, Schn.**16. Collyris ortygia**, Buq.

The three preceding species were not uncommon on Bukit Besar in May and September.

**17. Therates**, sp. incert.

Bukit Besar, Nawngchik. 2,500 feet. May, 1901.

A couple of specimens of a small species of this genus were captured among low herbage. The form is not represented in the British Museum collection and does not appear to be described, but in the absence of further material I prefer not to name it.



ODONATA

PART I

BY

F. F. LAIDLAW, B.A., CANTAB.



## INTRODUCTORY NOTE

THE first part of Mr. LAIDLAW's paper now published contains an account of a small section of the Odonata that, in the Malay Peninsula at any rate, is especially characteristic of the true jungle fauna. In the Patani States it is almost certain that it does not occur on the lower reaches of the rivers, nor, indeed, except in districts where the primaeval forest has been but little interfered with.

The species seem to be dependent on the presence of rapid running streams of clear water from which, with but few exceptions, they are rarely found far distant. It will be noted that the whole of our collection was obtained in three localities, and that more than two-thirds of the total number of specimens were captured in less than a week at Mabek in the Hulu Jalor, where the richness of the Odonate fauna far exceeded anything that we met with elsewhere. Dragon flies were very numerous at Bukit Besar, but for some reason, were exceedingly scarce at Telôm in January, where only three or four species were even seen, and with the exception of a few of the commoner rice-field forms, this scarcity was almost as noticeable in every place we visited in South Perak, during January and February, 1902, except at Jor.

The present list includes all the species of Agrioninae known to occur in the Peninsula, twenty-two in number, of which our collection contains representatives of eleven, though it is not improbable that this number will be largely increased when the mountainous districts of the Peninsula have been more fully explored.

HERBERT C. ROBINSON



## REPORT ON THE DRAGON FLIES

By F. F. LAIDLAW, B.A., CANTAB.

**B**EFORE commencing my description of Messrs. ANNANDALE and ROBINSON'S collection, I must acknowledge my indebtedness to Dr. F. FÖRSTER who has, with the greatest generosity, permitted me to incorporate in my lists the name of known species contained in a large collection in his possession from the mountains between Perak and Pahang; thus enabling me to give a very fairly complete list of the species known from the Peninsula (since his collection contains several species not contained in the present one, and *vice versâ*). But, in addition to this, he has furnished me with many valuable notes for inclusion in my paper. These notes are, in every case, printed within square brackets [ ], and it is hardly necessary for me to add that by his kindness Dr. FÖRSTER has greatly enhanced the interest, already very considerable, of the large and carefully-collected series of specimens obtained by Messrs. ANNANDALE and ROBINSON.

I take the opportunity of thanking Mr. KIRBY, of the British Museum, for his unfailing courtesy and ready assistance on several occasions when I have found it necessary to compare specimens with those in the British Museum. My thanks are also due to my mother, who has given me much assistance in transcribing the following notes.

As to the literature of the subject, sufficient reference to papers published before 1890 will be found in KIRBY'S invaluable *Catalogue of the Neuroptera Odonata*. Since that date the most important papers dealing with the Odonate fauna in the immediate neighbourhood of the Peninsula are DE SELY'S 'Odonates de Birmanie' (*Ann. Mus. Civ. Gen.* (2) x (1891)) and KRUGER'S important work on the Odonate fauna of Sumatra, published in the *Stettin Ent. Zeit.* of 1898-1899 and 1902.

Comparison of the present list of species with that contained in the two papers above mentioned will show that the fauna of the Peninsula is more closely related to that of Sumatra than that of Burmah.

I have recently published a brief account of a collection of dragon flies from the Malay Peninsula. References to these and other papers are given in the text when necessary.



## PART I

## AGRIONINAE (Calopteryginae, De Selys)

## LEGION AGRION

1. *Echo (Climacobasis) modesta*, Laidlaw

♂ *Climacobasis lugens*, Laidlaw, *P.Z.S.* 1902 (1) p. 85, pl. vi, fig. 5.

♀ *Echo modesta*, *ibid. loc. cit.* p. 84, pl. v, fig. 6.

A fine series of 5 ♂ and 2 ♀ all from Bukit Besar, Nawngchik, from an altitude of 2,500-3,000 feet.

There can be no doubt that the two species which I founded on a single specimen in each case, are merely male and female of the same species. The generic name may be retained as that of a section of the genus *Echo*, distinguished by the great relative length of the pterostigma in the male, in which it is about three times as long as in the female. This character serves to separate this species from the two or three species of *Echo* already known in which the pterostigma of the male is described as being short, or at most, only very slightly longer than in the female.

On the other hand, it is readily distinguishable from the remarkable *Archineura*, which it resembles in the length of the pterostigma by its smaller size and less complex neuration.

I have already described the characters of the female from a somewhat immature specimen. The mature female differs in having the pterostigma dark brown.

As to the male, the curious white pruinose mark on the top of the head is only present in fully mature specimens. The wings are shorter and narrower than in the female, and the abdomen is slenderer, the ninth segment is only one-half the length of the eighth.

The upper pair of appendages are one-third as long again as the lower pair, and about as long as the ninth segment.

The pterostigma in the adult male is black. In young males it is whitish brown.

The following is the literature dealing with this and allied genera :—

SELYS. *Synopsis des Calopterygines*  
*Monographie des Calopterygines*, 1854

(*Echo margarita* ♀ described)

„ *Bull. Acad. Belg.* (2) xlvii, p. 356 (1879)

Z

*Echo margarita* ♂, ♀ described  
 „ „ race ? *tripartita* ♂, ♀ described  
*Echo ? uniformis* ♂ „

SELYS. *Ann. Soc. Ent. de Belgique*, xlii (1898), p. 335.

*E. uniformis*, ♂ ♀, described

KARSCH. *Berl. Ent. Zeitschr.* xxxvi, p. 455 (1891).

*E. incarnata* described

*Ent. Nachr.* xx, No. 6, p. 84 (1894)

Remarks on KIRBY's *Archineura basilactea*

KIRBY. *Ann. Mag. Nat. Hist.* (6) xiii, p. 86 (1894)

*Archineura basilactea* described

*loc. cit.*, p. 450. Reply to Dr. KARSCH (see above)

MACLACHLAN. *Ann. Mag. Nat. Hist.* (6) xvii, p. 370 (1896)

Remarks on *Archineura incarnata*, KARSCH

KRUGER. *Ent. Zeit. Stettin*, 1898, p. 72

*E. iricolor*, n. sp. ♂ ♀, ? = *E. uniformis*

„ *loc. cit.*, *E. iricolor* = *E. uniformis*

LAIDLAW. *Proc. Zool. Soc.* 1902, pp. 84, 85

*Echo modesta* and *Climacobasis lugens* described

## 2. *Neurobasis chinensis* (Linn.)

*Neurobasis Chinensis*, Kirby, *Cat. Odonata*, p. 102 (1891); Kruger, *Stett. Ent. Zeit.*, 1898, p. 74; Först. *Ann. Soc. Ent. Belg.* xli, p. 210 (1897); Laidlaw, *P.Z.S.* 1902, p. 86.

10 ♂, 3 ♀, taken in July in Jalor. Mostly noted as having been caught 'flying over the river.'

'Frequents places where the current is strong, occasionally flying along with hind wings depressed, just touching the surface of the water; then very conspicuous, the hind wings appearing emerald green in sunlight and peacock blue in subdued light. Often settling on a black rock, with the wings raised over the back as in a butterfly; in this position quite inconspicuous.'

All the females belong to the typical variety *quadrimaculata*. 'Wings golden brown with yellow spots on the anterior margin.'

['Camp Jor' (GRUBAUER) var. *quadrimaculata*, var. *bipunctata*, and var. *florida*, also forms with variations in the length of the legs.']

The var. *florida* occurs in Penang and in the Baram district of Borneo.

### 3. *Vestalis amoena*, Hagen

*Vestalis amoena*, Kirby, *Cat. Odonata*, p. 103 (1891); Kruger, *Stett. Ent. Zeit.*, 1898, p. 75; Laidlaw, *P.Z.S.* 1902 (i), p. 87.

6 ♂, 2 ♀. Bukit Besar, Nawngchik. 2,500-3,000 feet. May and August, 1901.

2 ♀. Bukit Besar, Nawngchik. 2,000 feet. September, 1901.

'Jungle near water, dull morning.'

1 ♂. Mabek, Jalor. July, 1901.

'Flying in the jungle, mid-day.'

1 ♀. Jarum, Rhaman. April, 1902.

'Very common in jungle, *not necessarily near water*; abdomen dark bronze, thorax dark emerald green, eyes black, wings purplish iridescent.'

Occurs also in Dr. FÖRSTER'S collection. Perhaps the commonest Calopterygine that occurs in the Peninsula. Its habits are markedly in contrast with those of most of its nearest relatives.

### 3. *Vestalis lugens*, Alb.

['1 ♂. Taken by GRUBAUER at Camp Jor at an altitude of 2,000 m. (? ft.'). Identical with specimens from High-Sumatra.']

## LEGION EUPHAEA

### 4. *Euphaea ochracea*, Selys

*Pseudophaea ochracea*, Kirby, *Cat. Odonata*, p. 109 (1891).

*Euphaea ochracea*, Selys, *Ann. Mus. Civ. Genoa*, (2) x, p. 489; Laidlaw, *P.Z.S.* 1902 (i), p. 87.

One male, from the State of Patani? (more probably from Bukit Besar).

'*Puting betlong*, Patani Malay for dragon flies generally. Wings deep copper colour, abdomen and head black, thorax marked with dull crimson. Jungle stream, mid-day.'

1. If the 'Camp Jor' of Grubauer is the same place as that visited by us (cf. itinerary) its approximate altitude is 2,000 feet, not metres. There is no camp in the Perak-Pahang boundary range as high as 2,000 metres, the extreme summits of a few mountains only just exceeding this height. EDD.

The colour of the abdomen is of a very dull dark-brown rather than black. The wings appear of a much richer colour when the insect is flying than after death.

This species belongs to a group of closely allied species or perhaps geographical races, which range from the Khasia Hills (where *E. brunnea*, a fairly distinct form, much larger than the typical *E. ochracea* occurs) through Burmah and the Peninsula into the Archipelago, where again the forms are mostly large, e.g., *E. lara* from Sumatra, etc.

[‘Camp Jor (GRUBAUER) with variations in size : Kelantan (WATERSTRADT).’]

**5. *Euphaea masoni*, Selys**

*Pseudophaea masoni*, Kirby, *Cat. Odonata*, p. 110 (1891).

4 ♂. Mabek, Jalor. July, 1901.

‘Black, except for the transparent patches on the wings.’

These specimens agree closely with the types from Tenasserim, but the costal spaces are not black, only the sub-costal spaces are so coloured. Occurs also in Tonquin.

**6. *Euphaea aspasia*, Selys**

Camp Jor, 2,000 m. (? ft.) (GRUBAUER).

[‘Identical with specimens received from Mr. G. SCHREIDER from Dalak, mountains of Rajah, High Sumatra.’]

**7. *Euphaea impar*, Selys**

Recorded by myself (*P.Z.S.* 1902 (i), p. 87) from the Kelantan River. Not represented in this collection.

**8. *Dysphaea limbata*, Selys**

*Dysphaea limbata*, Kirby, *Cat. Odonata*, p. 110 (1891); Kruger, *Stett. Ent. Zeit.*, 1898, p. 78; Laidlaw, *P.Z.S.* 1902 (i), p. 88.

♂. Mabek, Jalor. July, 1901.

‘On river ; colour velvety black, with a shade of purple on the wings.’

[‘♂. Camp Jor (GRUBAUER) : Kelantan (WATERSTRADT).’]

I believe that no specimen has previously been captured so far to the north as that taken in Jalor. The genus is confined to the Peninsula and to the Islands of Java, Sumatra, and Borneo.

## LEGION LIBELLAGO

The distribution of *Rhinocypha*, perhaps the most characteristic Oriental Odonate genus, presents several features of interest. Firstly, it is noteworthy that no species of the genus is known from Ceylon. Compare with this the absence of the genus *Draco* among lizards, and *Diplommatina* and *Alycaeus* amongst the land Mollusca; all three otherwise widely spread and characteristic of the whole Oriental region. It will be interesting to learn whether other cases of this nature occur.

Following DE SELYS, the genus may be subdivided roughly as follows:—

- A. Two rows of postcostal cells (often rudimentary); opaque marks on hind wings of males, with hyaline 'windows.'
  - 1. Group of *R. quadrimaculata*.
- B. A single row of postcostal cells.
  - (a) Opaque marks on the hind wings of the males, with hyaline windows.
    - 2. Group of *R. perforata*.
  - (b) Opaque marks on hind wings without 'windows;' the females in some cases also have opaque marks on the hind wing.
    - 3. Group of *R. tincta*.

Group 1 is mainly Himalaic, and as far as I know, confined to the mainland of Asia. *R. fenestrella*, its representative in the Peninsula, which is very closely allied to *R. quadrimaculata*, SELYS, of India, and to *R. spuria*, SELYS, of the Khasia Hills, extends further south than any other species of the group.

Group 2 has one species in Thibet, viz., *R. trimaculata*; the remaining species range from India to Cochin China and Hainan, and down into the Peninsula and the greater Sunda Islands, but not further east than Java. The Peninsular species are *R. biforata* and *R. apicalis*.

Group 3, typified by *R. tincta*, is capable of further sub-division, but this cannot be attempted within the limits of the present paper. It contains numerous species ranging from Sumatra and the Peninsula, where it is represented by the interesting little *R. karschi*, intermediate between *R. heterostigma* and *R. tincta*, and by *R. petiolata*, to New Guinea.

Thus in the Peninsula, and apparently there only, the three groups overlap.

**9. *Rhinocypha fenestrella*, Ramb.**

*Rhinocypha fenestrella*, Kirby, *Cat. Odonata*, p. 113 (1891); Selys, *Ann. Mus. Civ. Genoa* (2) x, p. 491.

8 ♂, 2 ♀. Bukit Besar, 2,500 feet, Nawngchik. May, 1901.

‘♂ Rests on stones in streams, with wings almost touching the body along their whole length.’

With another male is the following note:—‘Jungle stream, mid-day; white under surface of tibiae conspicuous in this specimen, which was hovering round the female, a dull greenish insect.’ A female is said to have the thorax marked with pale green, and to be most inconspicuous.

5 ♂, 1 ♀. Telöm, Perak-Pahang border, altitude 4,000 feet. January, 1902.

Note with a male, ‘Dances in the air before the female, displaying white surface of tibiae.’

2 ♀. Upper Batang Padang Valley, 3,000 feet, South Perak. January, 1902.

[Camp Jor, 2,000 m. (ft. ?) (GRUBAUER) : Kelantan (WATERSTRADT)].

#### 10. *Rhinocypha biforata*, Selys

*Rhinocypha biforata*, Kirby, *Cat. Odonata*, p. 113 (1891); Laidlaw, *P.Z.S.* 1902 (1), p. 88.

2 ♂. Mabek, Jalor. July, 1901.

One ‘flying over river,’ the other, ‘on edge of jungle stream. Dull morning. Thorax velvety black, marked on the sides with pale blue. In the centre of the dorsal surface a triangular mark of mauve pink. On the sides five stripes, pink posteriorly shading into blue anteriorly. Abdomen black with delicate blue marks on the sides. Legs and head black.’

[Camp Jor and Kelantan].

#### 11. *Rhinocypha apicalis*, Kruger

*Rhinocypha apicalis*, Kruger, *Stett. Ent. Zeit.*, 1898, p. 79.

*Rhinocypha inas*, Laidlaw, *P.Z.S.* 1902 (i), p. 90, pl. vi, fig. 7.

[Camp Jor, 1,200 m. (ft. i) (GRUBAUER) : Kelantan (WATERSTRADT)].

I believe that Dr. FORSTER is correct in identifying my species with that very briefly noted by KRUGER. When I wrote my description of *R. inas*, I had not the opportunity of comparing it with *R. bisignata*. It certainly resembles *R. whiteheadi* from Hainan very closely.

#### 12. *Rhinocypha petiolata*

Recorded from the Peninsula, but not included in the present collection.

#### 13. *Rhinocypha karschi*, Kruger

*Rhinocypha karschi*, Kruger, *Stett. Ent. Zeit.*, 1898, p. 33; Laidlaw, *P.Z.S.* 1902 (i), p. 90.

Not included in the present collection ; taken by myself on the Aring River, in Kelantan.

**14. *Micromerus stigmatizans*, Selys**

*Micromerus stigmatizans*, Kirby, *Cat. Odonata*, p. 115 (1891).

This and the next species belong to a section of the genus in which the males have a pterostigma on all four wings, while in the remaining species of the genus the pterostigma is absent on the fore wings. This section appears to be confined to the Peninsula, where two species occur, and to Borneo, which has three species. Neither of the Peninsular species is included in the present collection.

**15. *Micromerus hyalinus*, Selys**

**16. *Micromerus lineatus*, Burm.**

*Micromerus lineatus*, Kirby, *Cat. Odonata*, p. 115 (1891).

5 ♂, 1 ♀. Mabek, Jalor. July, 1901.

The following is a note on one of the males :—‘ Flying over river at mid-day ; the wings moved so fast that they were quite invisible. Head and thorax velvety black, marked with pale yellow green. Abdomen, five proximal segments orange yellow, marked with black ; distal segments velvety black, as is the ventral surface. Anterior surface of tibiae white.’ The female was taken flying with the male.

[‘ Camp Jor (GRUBAUER). The black marks on the dorsal surface of the abdomen appear to become more extended with age.’]

**17. *Micromerus signatus*, Kruger**

Recorded from Penang.

**18. *Micromerus aurantiacus*, Selys**

Not included in the present collection.

**19. *Micromerus annandali*, sp. nov.**

1 ♂. Mabek, Jalor. July, 1901.

‘ On river. Dorsal surface of abdomen deep red.’

Related to *M. aurantiacus* and possibly a local race, but sufficiently distinct to merit a description and name.

The most obvious distinction lies in the colour of the dorsal side of the abdomen, which in *M. aurantiacus* is golden or orange yellow, but in the present species, dark brick-red. The dorsal surface of the head is black. There are four small yellow spots lying at the angles of a square just in front of the anterior ocellus, two others on either side of the two posterior ocelli, and two others, more widely separated, behind those on the vertex.

*Prothorax* black, with a pair of lateral yellow spots, an anterior yellow line, and a posterior yellow median spot.

*Thorax* black, the mesothoracic ridge and a pair of narrow antehumeral stripes incomplete above, yellow. Humeral stripes reduced to a small yellow mark at the upper end of the suture. Two broad lateral stripes on either side yellow, the anterior pair interrupted at about its middle, and again near its upper end by a projection into it of the black ground-colour.

*Abdomen*, upper surface deep red, articulations black; under surface orange yellow with a broad median stripe, but the whole under-surfaces of segments 9-10 is black. Sides of segment 1 black with a round yellow spot. On either side of segments 2-6 is a triangular yellow mark, with its apex directed backwards, enclosed within a black border. In segments 2-4 the black margin does not quite reach the hinder limit of the segment, whilst in segments 5-6 it does so, and the black commences to widen out against the articulation. From segments 7-10 the yellow mark is absent, and the black now forms a triangle with its apex directed forwards. The sides, beyond the triangle in segments 2-4, are yellow. On the dorsal side of segments 2-3, near their hinder ends, is a transverse black mark interrupted in the middle.

Anal appendages black, the upper pair rather long and slender, without projections, three times as long as the lower pair, which are rather stouter and conical. Legs black, the inner sides of the last two pairs of femora whitish distally.

Wings very narrow and brightly iridescent. No pterostigma on the anterior pair, which have 5-6 antenodals. Apical spot longer than it is broad, not reaching the hind margin, rather less than one-fifth the length of the wing. Pterostigma (of hind wing) black, covering rather more than two cells.

Length of abdomen, 13 mm.; hind wing, 15.5 mm.; apical spot, 2.75 mm.

## 20. *Micromerus semiopacus*, Selys

[‘There exist three closely-related forms or “sub-races” living, perhaps, separately in Borneo, Sumatra, and the Malay Peninsula, viz., *M. semiopacus*, SELYS (type) in Borneo; *M. semiopacus*, SELYS, sub-race *martinae*, KARSCH in

Sumatra; and *M. semiopacus* sub-race *affinis*, LAIDLAW in Kelantan (♂, ♀, LAIDLAW; ♂♂, WATERSTRADT). KARSCH compares *M. martinae*, KARSCH, with *M. xanthocyaneus* from the Celebes. But KARSCH's species undoubtedly differs but slightly from the typical Bornean *M. semiopacus*, SELYS. In *M. semiopacus* the dark tips of the fore wings are  $6\frac{1}{4}$  mm. in length, in *M. martinae*, 5 mm., and in *M. affinis*,  $5\frac{1}{4}$  (LAIDLAW), and in WATERSTRADT specimens only 4 mm. In all these forms the dorsal surface of segments 3-5 of the abdomen carries a longitudinal rectangular light yellowish spot, which is divided in two by the black carina. In some cases, by an angular encroachment of the black ground from the sides, these paired spots are changed into two, 7 set back to back. The 7-shaped marks occur in segments 4-5 of *M. affinis*, in 3-4 of *M. semiopacus* (probably also in 5), and very imperfectly in *M. martinae*.

Segment 6 is identical in all three, and the light mark projects as a rectangle from the anterior margin of the segment. In *M. lineatus*, on the other hand, it projects as a rhomboid, and in *M. stigmatizans* nearly as a circle.

*M. martinae* is more distinct from the typical form, *M. semiopacus*, than is *M. affinis*, which is very nearly identical with it, since the extent of the opaque apical spot of the fore wing is evidently variable, and the darkened tip of the fore wing is merely a mark of age. In all three the epistone is metallic blue, partially wrinkled. In *M. affinis* the light markings of the abdomen are pale green.]

The continuance of the black apical mark on the fore wing, right across the wing, serves to distinguish these three species at a glance from those of the *lineatus* group.

My specimens of *M. affinis* were, to the best of my recollection, pale yellow in colour in life, so far as the markings of the abdomen are concerned.

(See KARSCH, *Ent. Zeit.*, Berlin, xvii (1891), No. 16, for *M. martinae*; for *M. affinis*, see LAIDLAW, *P.Z.S.* 1902 (i), p. 90, pl. vi, fig. 7).

## LEGION AMPHIPTERYX

### 21. *Devadetta argyroides* (Selys)

*Devadetta argyroides*, Kirby, *Cat. Odonata*, p. 111 (1891).

1 ♂, 3 ♀. Bukit Besar, 2,500 feet, Nawngchik. May, 1901.

1 ♂. Mabek, Jalor. July, 1901.

'Flying beside jungle stream.'

Two of the female specimens from Bukit Besar where taken 'flying in the jungle,' one 'in the morning' and 'early afternoon, before rain.' The male is labelled 'jungle stream, mid-day.' One of the females is briefly

described as follows :—‘ Abdomen dark-brown with paler bars, fawn spot on wings (*pterostigma*), faint blue spots on thorax.’ The coloration is, in fact, practically identical with that of the male.

The first two joints of the antennae in both sexes are stout, the second nearly half as long again as the first ; the third is short and club-shaped, slenderer than the second. To the generic characters given by DE SELYS, it may be added that the wings are petidated almost to the level of the commencement of the quadrilateral.

I have examined a specimen of this species collected on Mount Kina Balu, in Borneo.

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