

It proves to be new, and I propose to call it

STENODERMA MONTSERRATENSE, sp. n.

Most nearly allied to *S. nichollsi*, Thos.¹, with which it agrees in the characters which separate that from *S. rufum*, Geoffr., but distinguished by its decidedly larger size, stouter build, and by the proportions of the canines and premolars, both above and below, which are broader horizontally and less elongate vertically. The inner upper incisors are as distinctly bicuspidate as in *S. achrado-philum*, Gosse. Molars $\frac{3}{3}$, their proportions much as in *S. nichollsi*; the last upper transversely oval, proportionally rather larger than in the allied species; their area in cross section nearly equal to that of the inner upper incisors.

Palatal emargination long and narrow.

External characters as usual, except that the fur on the upper surface of the arms, wing-membranes, and legs is thicker and more extended, and also that, as compared with *S. nichollsi*, the colour is more of a slaty than a brownish grey. No facial streaks or white shoulder-marks.

Dimensions of the type, an adult male in spirit:—Head and body 69 mm.; ear from notch 16·5; forearm 51·5 (= 2·03 in.); lower leg 23; knee to most distant point of hind claws 35·5.

Skull: basal length 18·2; greatest length 23·6; zygomatic breadth 16; interorbital breadth 7·1; palate, breadth outside $\frac{m.^1}{10\cdot5}$, inside $\frac{m.^1}{4\cdot4}$; basion to front of palatal notch 13·2; front of canine to back of $\frac{m.^2}{7\cdot4}$, ditto below 7·4.

Hab. Montserrat, West Indies.

This Bat is said to hang all day under the branches of trees, and not to take refuge in holes and crannies as most species do.

February 20, 1894.

Prof. G. B. HOWES, F.Z.S., in the Chair.

Mr. Arthur Thomson, the Society's Head Keeper, exhibited a series of Insects reared in the Insect-house in the Society's Gardens during the past year, and read the following Report on the subject:—

Report on the Insect-house for 1893.

Examples of the following species of Insects have been exhibited in the Insect-house during the past season:—

Silk-producing Bombyces and their Allies.

Indian.

Attacus atlas.

— *cynthia.*

— *pernyi.*

Antheræa mylitta.

Actias selene.

¹ Ann. Mag. N. H. (6) vii. p. 529 (1891).

Japanese.

Antheræa yama-mai.

Australian.

* *Antheræa*, sp. inc.

American.

*Samia cecropia.**Telea polyphemus.*— *promethea.**Actias luna.**Hypochera io.*

African.

*Antheræa tyrrhea.** — *belina.**Cirina forda.**Actias mimosæ.**Gonomita postica.*

Diurnal Lepidoptera.

European.

Papilio podalirius.— *machaon.**Thais polyxena.**Gonepteryx rhamni.**Argynnis paphia.*— *euphrosyne.**Melitæa cinxia.**Vanessa polychlorus.*— *antiopa.*— *atalanta.**Charaxes jasius.**Arge galathea.**Lycæna corydon.*— *adonis.*

American.

Papilio ajax.— *asterias.*— *troilus.**Papilio cressphontes.*— *turnus.**Limenitis disippus.*

Nocturnal Lepidoptera.

Smerinthus ocellatus.— *quercus.*— *tiliæ.**Triptogon modesta.**Sphinx ligustri.*— *convolvuli.*— *pinastri.*— *carolina.**Deilephila vespertilio.*— *euphorbiæ.**Chærocampa elpenor.*— *nerii.**Macroglossa stellatarum.** *Sesia culiciformis.** — *bembiciformis.**Zygæna filipendulæ.** *Lasiocampa monteiri.** *Rhabdosia*, sp. inc.*Endromis versicolor.**Saturnia carpini.*— *pyri.**Eacles regalis.*— *imperialis.**Anisota rubicunda.*

* Exhibited for the first time.

Of the lepidopterous insects which I have the honour to place before the Meeting this evening the following are exhibited for the first time:—*Antheræa belina*, from Natal; *Antheræa*, sp. inc.,

from Australia; *Sesia culiciformis* and *Sesia bembiciformis*, European; *Lasiocampa monteiri* and a species of *Rhabdosia*, both from S.E. Africa.

The specimen of *Lasiocampa monteiri* is not set out, as the upper edges of the *under* wings present a very curious hairy appearance, and look as though they had been singed. This could not be seen in a set-specimen. The specimen of *Rhabdosia*, sp. inc., is a male, and there is a single specimen (a female) in the National Collection, but it has not yet been named.

The cocoons of *Actias mimosæ*, from which the specimens exhibited emerged, were very kindly sent from S.E. Africa by the Rev. H. A. Junod, who had seen our Insect-house before leaving Europe. Other cocoons of this species were deposited by the Hon. Walter Rothschild, from which five pairs of moths emerged.

During May last I captured some wild specimens of the common Pearl-bordered Fritillary, and placed them in one of the cases, with a good supply of their food-plant (*Viola*): many eggs were laid. The young larvæ hatched in due course, and fed well at first; they then became sluggish and crawled into the corners of the case. After a time they commenced to feed again, and a second brood was produced—the first specimen emerging on the 31st July. I exhibit this evening half a dozen examples of this second brood. In a state of nature this species is single-brooded.

The specimens of the Hornet Clearwing of the Osier (*Sesia bembiciformis*) that were exhibited during the past season created great interest; and many visitors, before reading the label, thought they were really hornets or wasps.

The most remarkable and interesting insect exhibited during the past year was a Goliath Beetle (*Goliathus druryi*) from Accra, West Africa, which was presented by F. W. Marshall, Esq., on the 5th October, and which died on the 16th of December. This is probably the first specimen of this Beetle ever brought to England alive. It had been in Mr. Marshall's possession since May 1893, and had been in England some time before it was received at the Gardens. It fed principally upon fruit, and preferred ripe melons to any other food.

Of Orthoptera a large number of the Canadian Stick-insects (*Diapheromera femorata*) were reared from ova deposited in 1892. Three specimens of Leaf-insects (*Phyllium gelonius*) from the Seychelles were presented by Dr. Nowell in December; but I am sorry to say they did not live long.

Mr. Oldfield Thomas exhibited the skin of a Giraffe from Somaliland, which had been brought to his notice by Messrs. Rowland Ward and Co., and pointed out the considerable difference in the character of the markings shown by it as compared with the S.-African Giraffe. In the Northern form the dark marks were large, sharply defined, and only separated from each other by narrow pale lines; while in the S.-African form these marks were

mere vaguely defined blotches, comparatively far apart from each other. These differences were well seen on a comparison of the figure given by Harris of the Southern Giraffe¹ with those given by Rüppell² and Brehm³ of the Northern one.

Prof. Sundevall had already noticed the difference in the general colour of the two animals, and had given to the Northern form the varietal name of *Camelopardalis giraffa*, var. *æthiopica*⁴.

A communication was read from Dr. R. W. Shufeldt, C.M.Z.S., giving particulars of the methods used in preparing certain Invertebrates, which were adopted by the experts at the U.S. National Museum, in the case of specimens sent to Chicago for exhibition at the World's Columbian Exposition. This communication was illustrated by photographs of the objects in question. After the preparation of finished moulds of these objects, gelatine casts were made from the moulds, the gelatine being made of the following composition :—

Best Irish Glue.....	4 oz.
Gelatine (photographers')....	2 „
Glycerine	4 „
Boiled Linseed-oil	$\frac{1}{4}$ „

The gelatine casts were then coloured to resemble the objects in life.

The following papers were read :—

1. On the Mammals of Nyasaland : third Contribution.

By OLDFIELD THOMAS, F.Z.S.

[Received February 13, 1894.]

The present paper contains an account of the third and fourth collections of Mammals made and presented to the National Museum by Mr. H. H. Johnston, C.B., Consul-General for British Central Africa, with the help of his able assistant, Mr. Alexander Whyte, F.Z.S. Papers on the two previous collections have already been published⁵.

The series now described bears out the prophecy I ventured to make in 1892, that as Mr. Whyte's knowledge of the locality increased he would be able to obtain the rarer and more local species, and that among these there would certainly be some

¹ 'Wild Animals of S. Africa,' pl. xi. (1840).

² Atlas Reise N. Afr. pl. viii. (1826).

³ 'Thierleben,' iii. p. 188 (1880).

⁴ "Pecora," K. Vet.-Ak. Handl. 1844, p. 175.

⁵ P. Z. S. 1892, p. 546; and 1893, p. 500.

novelties. For although there are not a very large number of species altogether represented in the present collection, yet several are new to the locality, one is a rediscovered species described thirty years ago, and two are new to science.

The Mammal-fauna is therefore evidently far from worked out, and Messrs. Johnston and Whyte should be encouraged to continue their explorations until, after the receipt of five or six more similar collections, we may perhaps be in a position to say that our knowledge of the Mammals of the district approaches completion.

1. *CERCOPITHECUS ALBIGULARIS*, Sykes.

a. Ad. sk. ♂. Fort Lister, Milanji, 3500 ft. 16/7/93.

b. Ad. sk. ♀. Milanji Plateau, 6000 ft. 26/4/93.

For the determination of these two Monkeys I am indebted to Mr. Sclater, who has been recently making a study of this group, and who has kindly furnished me with the following note respecting them:—

“The male is much larger, and shows no rufous on the rump and arms. The smaller female has these parts strongly tinged with rufous. This is probably a sexual distinction, as it was no doubt on a similar specimen that *C. erythrarchus*, Peters (which Dr. Matschie has lately pronounced to be = *C. albigularis*, cf. Sitz.-Ber. nat. Freunde Berl. 1893, p. 215), was based. The female specimen agrees well with the figure of *C. erythrarchus* in the ‘Reise nach Mossambique,’ and with a female specimen formerly living in the Zoological Society’s Menagerie.”

2. *OTOGALE KIRKI*, Gray.

a. Ad. sk. Blantyre. 2/93.

b-d. 3 do. Shiré Highlands. 12/92.

3. *GALAGO MOHOLI*, A. Sm.

a. Ad. al. ♀. Zomba.

4. *EPOMOPHORUS CRYPTURUS*, Pet.

a. Ad. al. ♀. Zomba.

Forearm 78 mm.

I entirely agree with Prof. Du Bocage¹ in considering that *E. crypturus* of Peters is not synonymous with *E. gambianus*, as stated by Dobson, but is a valid species intermediate between *E. macrocephalus* and *E. minor*. At the time of Dobson’s Catalogue there was not a specimen of it in the Museum, while *E. gambianus* was represented by two examples from the Zambesi, so that he naturally supposed Peters to have got hold of the same form, especially as the latter’s very imperfect description of the palate-ridges applies perfectly to those of *E. gambianus*.

Sundevall’s *Pteropus wahlbergi* from Natal appears, by the dimensions given, to be really *E. gambianus*, but *E. crypturus* also occurs

¹ J. Sci. Lisb. (2) i, p. 3 (1889).

there, as is shown by a specimen from that country presented to the Museum by Capt. Shelley in 1881.

5. RHINOLOPHUS HILDEBRANDTI, Pet.

a. Ad. al. ♂. Zomba.

Forearm 65 mm.; ear, length 36; nose-leaf 25×13.5 .

This fine Bat I had at first supposed to be new, owing to the fact that Peters had only re-softened skins to describe, and these scarcely showed its most remarkable characteristics, namely the great size of the ears and nose-leaf, and the development of a distinct crenulate supplementary leaflet outside the horseshoe. Nor did its describer observe that it is entirely without the minute intermediate lower premolar which most of the species possess, but which is also absent in *R. æthiops*. The British Museum, however, contains one of Hildebrandt's typical specimens, and a comparison with this proves the identity of the Nyasa example with it. The discovery of *R. hildebrandti* in Nyasaland effects a great extension of its range, as it was originally described from Taita, E. Africa.

6. RHINOLOPHUS LANDERI, Mart. (?).

a. Ad. al. Zomba. 1/93.

This specimen differs from typical *R. landeri*, and equally from Peters's *R. lobatus*¹, probably synonymous with it, in the much greater breadth of the horizontal portion of the nose-leaf, which entirely covers the muzzle. As, however, a specimen quite agreeing with the true *R. landeri* was obtained on the Shiré by Kirk and Livingstone (specimen c of Dobson's Catalogue), I think it possible that the difference above noted may be purely an individual one, and not indicative of any local distinction. Further specimens will, however, be necessary before this point can be properly cleared up.

7. RHINOLOPHUS CAPENSIS, Licht.

a. Ad. al. ♂. Zomba. 1/93.

8. HIPPOSIDERUS CAFFER, Sund.

a. Ad. al. ♀. Zomba. 1/93.

9. VESPERUS MEGALURUS, Temm.

a. Ad. al. Zomba. 1/93.

10. VESPERUGO NANUS, Pet.

a. Ad. al. Zomba. 1/93.

¹ Peters, 'Reise n. Mossamb.' Säug. p. 41 (1852). All reference to this species was accidentally omitted from Dobson's Catalogue, but in his supplementary report of 1880 (Rept. Brit. Assoc. 1880, p. 10) it is included among the Ethiopian species closely allied to and scarcely separable from *R. ferrum-equinum*, as is also the true *R. landeri*. Whatever may be the ultimate fate of the other forms here thrown together by Dobson, there can, I think, be little doubt as to the essential identity of *R. lobatus* with *R. landeri*.

11. PETRODROMUS TETRADACTYLUS, Pet.

a. Ad. sk. ♂. Zomba. 1/6/93.

12. FELIS SERVAL.

a, b. Imm. sks. ♂ ♀. Fort Johnston. 2/93.

13. HYÆNA CROCUTA, Erxl.

a. Ad. ♂ skin and skull. Zomba. Sept. 15, 1893.

The following are the dimensions of the skull:—Basal length 233 mm.; extreme length 286; zygomatic breadth 179.

14. RHYNCHOGALE¹ MELLERI, Gray.

Rhinogale melleri, Gray, P. Z. S. 1864, p. 575; Thomas, P. Z. S. 1882, pl. iii.

a, b. Ad. sks. ♂ ♀. Residency Garden, Zomba. 4/93.

c. Yg. al. Ditto.

"Wild fruits are always found inside the stomach of this Mongoose."—A. W.

The discovery of this fine Mongoose in Nyasaland is of considerable interest for two reasons. Firstly, its locality now becomes known with certainty, whereas hitherto it has been only conjectured² to occur on the Zambesi, a supposition that now proves to have been well-founded. Secondly and chiefly, owing to the fact that the original, and hitherto unique, specimen presented the remarkable number of five premolars on each side above, further specimens were urgently needed to show whether or not this was the normal number in the species. The importance of this point is exceedingly great, for no other known mammal has more than four premolars, and the exception presented by *Rhynchogale* has puzzled myself and other writers on the subject³. Believing as I do that four is and always has been the maximum number of premolars normally present, at least since middle Mesozoic times, it is something of a relief to find that the one known exception to this rule now disappears, as the perfect skull of specimen *a*⁴ has simply the normal number of four premolars, and we may consequently assume that the type was abnormal in its possession of five.

The occasional abnormal development of five premolars is well known in Carnivores, notably in dogs, and is, I believe, generally due to the fission into two of one or other of the normal set of four. I quite fail to see, as Mr. Bateson would have us do⁵, that such cases are any argument against a belief in the individual homologies of teeth, and are not explainable by the simple process, discovered and described by himself, of the fission of normal teeth.

¹ Nom. nov. = *Rhinogale*, Gray, P. Z. S. 1864, p. 575; *nec* Gloger, Handb. Naturg. pp. xxix and 75 (1842).

² P. Z. S. 1882, p. 86.

³ Cf. Phil. Trans. vol. 178, Biol. p. 456, 1887 (footnote).

⁴ Specimen *b* is so old that the teeth are all worn down or broken out, while specimen *c* is too young to show any teeth at all.

⁵ P. Z. S. 1892, pp. 102 *et seqq.*

In the instance before us, it is practically certain that the simple and attractive explanation, often put forward in such cases, that a milk premolar has been retained, instead of being shed in the usual way, is not applicable. For although there is no marked difference in size either between the most anterior premolar of the type and that of specimen *a*, or between the third of the type and the second of the same normal specimen, so that the tooth between them in the type would seem unlikely to be the product of the fission of either p^1 or p^2 , yet the mp^2 of other *Herpestinae* is in form entirely unlike the styliform extra tooth under discussion, and mp^1 has as yet never been certainly shown to be present in any Carnivore.

Mr. Whyte's observation on the food of *R. melleri* is of great interest, as its fruit-eating habits may perhaps account for the peculiar structure and wear of the molars. In all the three specimens before me the posterior molars appear to be more worn than the anterior, as though an unusual amount of chewing had fallen to their share; but it must be admitted that this appearance may be deceptive, and that the explanation may be that m^3 is naturally so much flatter than usual that it appears to be worn flat almost at once.

The foetal or new-born specimen *c*, preserved in spirit, shows not the slightest trace of a mesial naked line below the muzzle, and therefore lends weight to Dr. Gray's opinion as to the value of this character in dividing the genera of *Herpestinae*.

15. *CROSSARCHUS FASCIATUS*, Desm.

a. Ad. sk. ♀. Zomba. 1/93.

b. Yg. sk. Zomba. 1/93.

c. Yg. sk. Mpimbi, Upper Shiré.

16. *LUTRA MACULICOLLIS*, Licht.

a. Ad. sk. ♀. Fort Johnston, Upper Shiré. 11/92.

This specimen belonged to the collection worked out in May 1893, but was accidentally omitted from my previous paper. The species is a rare one, and this exact record of its occurrence is therefore of value.

17. *SCIURUS PALLIATUS*, Pet.

a, b. Ad. sks. ♂ ♀. Milanji Plateau. 13 & 15/4/93.

18. *SCIURUS MUTABILIS*, Pet.

a-i. Four adult and five young skins. Zomba. 12/92 and 1/93.

These midsummer specimens are of the greatest interest, as illustrating a little further the series of seasonal changes occurring in this remarkable species. The adult specimens are halfway through a change of fur, two of them having fresh grizzled-grey hairs on the anterior halves of their bodies and on their tails, while their posterior halves are clothed with ragged rufous or

almost straw-coloured fur; the other two are not quite so far advanced. Laying them beside the skins previously received it appears, although this must be for the present a merely tentative explanation, that the grey fur characteristic of October skins gradually bleaches under the influence of the summer sun, until its black rings become first brown and then rufous, this change being quite independent of the shedding and replacement of the fur itself. At the same time there is a change in the paler rings between white and yellow, but in which direction and at what particular season the series before me does not conclusively show, chiefly because, although marked with the month of capture, the exact days have not been noted, so that there is often a little uncertainty as to their exact succession. Coincidentally with this bleaching of the dark rings the true change of fur occurs, the fur first falling off on the head, then on the shoulders and tail, and remaining on the rump until in January it is, as already noted, nearly straw-coloured, with rufous subterminal and yellowish terminal rings. The bleaching of the fur from black to rufous during life may seem almost impossible, but that it really occurs is shown by the darker rings of the tail-hairs, which in October are all deep glossy black, but in November those near the bases of the hairs, where they are not exposed to the sun, are still nearly or quite black, while the terminal ones are brownish red.

The young specimens, all apparently of about the same age, introduce a further element of complexity into the question, for while four of them (Dec. and Jan.) are in a rufous stage, the fifth (December) is grizzled grey, exactly like the grizzled grey parents killed in October. I can make no suggestion for the elucidation of the mystery, but I would suggest, to any one having the opportunity, the collection of a mother and her whole litter of young, the skins to be marked with their exact date, and with the fact of their belonging to one another.

I may venture to hope that further collections will contain more specimens of this very remarkable species, so that I may later have the pleasure of giving a complete account of its changes all the year round.

The fourth collection, made from May to August 1893, contains, unfortunately, no specimens of *S. mutabilis*.

19. *MUS DOLICHURUS*, Smuts.

a. Ad. al. ♀. Zomba. 12/92.

b. Imm. al. Zomba. 12/92.

The following are the measurements of the well-preserved adult specimen:—Head and body 97 mm.; tail 155; hind foot, without claws, 22; ear from notch 15.5.

Mammæ 1—2=6.

20. *MUS MODESTUS*, Wagn.

a. Ad. al. Zomba. 1/93.

21. *ISOMYS DORSALIS*, A. Sm.

a. Ad. sk. Zomba. 2/93.

22. *CRICETOMYS GAMBIANUS*, Waterh.

a. Ad. sk. ♂. Zomba.

b. Ad. sk. Zomba. 27/4/93.

23. *LEPUS WHYTEI*, sp. n.

a. Ad. sk. ♂. Mpimbi, Upper Shiré. 4/93.

b. Ad. sk. ♀. Palombi R., Shirwa Plain. 15/8/93. *Type*.

c. Ad. sk. ♀. Zomba. 19/4/93.

Size and general colour above nearly as in *L. capensis*, but the back is more uniformly grizzled and less mottled. Fur decidedly harsher than in that species. Forehead with a white spot. Ears comparatively short; their external band brown all along, with a whitish margin; their extreme tips only black. Nape bright rufous. Sides slightly more rufous than back, but not nearly so much as in *L. capensis*. Chin white. Chest rufous fawn, as are also the upper surfaces of the hind feet. External surface of fore limb, and line down hind leg, richer rufous. Tail rather short, black, more or less mixed with rufous fawn above, white below.

Skull with a short muzzle, very broad proximally, narrow inter-orbital region, and narrow posterior narial fossa. Incisors broad, their groove close to their inner edge.

Dimensions of the type, an adult skin, female:—

Head and body 468 mm.; tail without hairs (c.) 47; ear, from notch, 88; hind foot, without claws, 95.

Skull: basal length 68; basilar length 65.5; greatest breadth 42.5; nasals, greatest length 37, greatest breadth 18; inter-orbital breadth 16.2; intertemporal breadth 12.7; diastema 21.5; anterior palatine foramina, length 20.5, combined breadth at surface 9.2; width (antero-posterior) of palatal bridge 8.6; least breadth of posterior narial fossa 5.

This Hare, which I have much pleasure in naming after Mr. Alexander Whyte, the able seconder of Mr. Johnston's efforts to investigate the fauna of Nyasa, is readily distinguishable from *L. capensis* by its harsher fur, rufous nape, shorter ears, feet, and tail, and somewhat different coloration. It is by no means improbable that the specimens from Angola which have been referred to "*L. ochropus*, Wagn.," really belong to *L. whytei*, but this point can only be determined later. The typical *L. ochropus* was described from the Cape itself, and, in agreement with Waterhouse, I can see no possible reason why it should not be looked upon as strictly synonymous with *L. capensis*.

24. *PROCAVIA JOHNSTONI*, sp. n.

a. Ad. sk. ♀. Fort Lister, 3500 ft. 20/7/93. *Type*.

b. Imm. sk. Fort Milanji. 27/7/93.

c. Yg. sk. Milanji Plain, 4000 ft. 27/10/91. (*P. capensis* of P. Z. S. 1892, p. 553.)

"Found among the rocks at base of cliffs."—A. W.

Allied to *P. capensis*, and therefore belonging to *Procavia* in the narrowest sense; no relationship to "*Heterohyrax*" or "*Dendrohyrax*."¹

* Size large. Fur comparatively harsh, at least in the type, killed in early summer. General colour of body brown grizzled with white, the grizzling far coarser than in *P. capensis*. Underfur smoky brown. Crown of head deep reddish brown, without white grizzling, much as in some of the red-headed examples of *P. abyssinica*. Cheeks grizzled grey, blacker just beneath the eye. Ears of medium length, thinly clothed internally with whitish, externally with black hairs. A prominent blotch behind and below the ears deep black, this colour running in the type vertically down the sides of the neck. Chin black; throat and chest grizzled grey; belly deep dirty yellow. In the younger specimens the throat and chest are, like the belly, yellow. Arms and legs like back, but the upper surfaces of the hands and feet are deep black.

Dorsal spot small, roughly oval, uniform black.

Skull equalling or even exceeding in size that of *P. shoana*, of which only three skulls, all in Stage VIII., of those measured in 1892, have a greater basal length than the present typical specimen, which is only in Stage VII. Diastema rather short, but longer than in *P. capensis* both above and below. Interparietal sutures persistent. Interparietal bone, as seen in specimen c, Stage II., before its form has been altered by the growth of the masseter, pentagonal, its longest side the posterior one, which is directly transverse, and nearly double the postero-lateral ones.

Teeth. Molars and premolars very large and heavy, exceeding those of any other species; no doubt, however, as in *P. capensis*, they will prove to be variable in this respect. P^1 sub-quadrangular, similar in shape to p^2 , far larger and stouter than in *P. capensis*. M^1 of type no less than 8.5 mm. in breadth, thus exceeding by 0.4 mm. the largest molar (of *P. shoana*) measured in 1892; its height too much reduced by wear to be worth measuring. Lower p^1 better developed and apparently more persistent than in *P. capensis*, its horizontal length in the type 3.3 mm.

Measurements of the *type*, in skin, ♀ :—

Head and body 560 mm.; [hind foot of specimen b, 53].

Skull (Stage VII.): basal length 90.5, greatest breadth 53; nasals, length (median) 23, breadth posteriorly 22.5; interorbital breadth 23, intertemporal breadth 26 [interparietal of specimen c, length 8.5, breadth 9.5]; palate, length 50; diastema, above 11, below 4; length of upper molar series 44, of lower molar series 45; height of lower jaw 50.

This fine new Dassy², which, as being the most striking new

¹ See "On the Species of the Hyracoidea," P. Z. S. 1892, pp. 50-76.

² This word, which is the common name given by the English Cape Colonists to *Procavia capensis*, may be conveniently used for any member of the genus.

Mammal discovered during Mr. Johnston's exploration of the Nyasa Fauna, I have named in his honour, is remarkable as being the only member of the genus distinguished by any colour-markings other than those of the dorsal spot. The prominent black ear-mark is in fact quite unique in the group, while its reddish-brown crown, although sometimes present in *P. abyssinica*, will readily distinguish it from its nearest ally, *P. capensis*, in which the crown is finely grizzled like the back. The unusual massiveness of the grinding-teeth will also readily separate *P. johnstoni* from all other forms.

The occurrence of this peculiar but clearly representative species between the ranges of *P. capensis* and *P. shoana* tends to confirm their distinctness from each other, on which I had thrown some doubt when writing in 1892.

Since my monograph of the genus was prepared, two species of *Procapia* have been described by Dr. Matschie¹, but both belong to the *Dendrohyrax* group, and have therefore nothing to do with *P. johnstoni*.

25. *PROCAVIA BRUCEI*, Gray.

a, b. Ad. & imm. sks. ♀. Mpimbi, Upper Shiré. 4/93.

c Yg. sk. Fort Lister, 3500 ft. 25/7/93.

These specimens probably represent *Hyrax mossambicus*, Peters. The youngest of them has already got its interparietal sutures closed.

The basal lengths of the three skulls are :—

a. (Stage VIII.), 79 mm.; *b.* (Stage V.), 71; *c.* (Stage III.), 63.

The ears of these examples are more prominently white than is usual in *P. brucei*, and their bellies and feet are also particularly white, characters in which they somewhat resemble the closely allied *P. bocagei*, and it is probable that when more specimens of the latter are obtained the two forms will be found to grade into one another.

In looking at the fine set of Dassies from Nyasa now sent, three of *P. johnstoni* and three of *P. brucei*, all found more or less together, one cannot fail to be struck by the peculiar method in which evolution seems to have been going on in the group. Not only do they afford a striking instance of the remark made previously² as to the constant occurrence together of one species of the hypsodont and one species of the brachyodont group, the competition between members of the two groups apparently not being severe enough to prevent their living together, but also, the practicability of their living together being once proved, they seem then to have tried to become as different from each other in their superficial characteristics as possible. Thus, while the hypsodont *P. johnstoni* is distinguished from its allies of the same group by its dark head, black ear-markings, dirty yellow belly, and black

¹ S.-B. nat. Fr. Berl. 1892, p. 110, and 1893, p. 112.

² P. Z. S. 1892, p. 57.

digits, *P. brucei* in Nyasa is distinguished from *P. brucei* elsewhere, as just mentioned, by its *white* ears, pure *white* belly, and *white* digits, each species when meeting its congener having, as it were, emphasized its own distinguishing characters in order to be unlike the other. For *P. brucei*, wherever found, is already characterized by its pale colour generally, whitish head, and white or pale yellow dorsal spots, while *P. capensis*, of which *P. johnstoni* may be looked upon as a modification, has a generally dark colour and a black dorsal spot.

Thus there seems to be between the two a sort of mutual "repulsion" in their characters, the exact converse of the better known "mimicry." Its object would very probably be that of furnishing the individuals of each species with "recognition marks" by which to know comrades from rivals.

26. RHINOCEROS BICORNIS, L.

a. Horns. Shiré Highlands.

27. PHACOCHÆRUS ÆTHIOPICUS, Pall.

a, b. Ad. skulls. ♂ ♀. Shiré Highlands.

28. BUBALIS LICHTENSTEINI, Pet.

a. Ad. sk. and skull. Shiré Highlands.

b. Skull. Shiré Highlands.

29. OREAS CANNA, H. Sm.

a, b. 2 ad. sks. ♀. Shiré Highlands.

30. STREPSICEROS KUDU, Gray.

a. Ad. skull. ♂. Shiré Highlands.

31. TRAGELAPHUS SCRIPTUS, Pall.

a. Ad. skull. Shiré Highlands.

32. KOBUS ELLIPSIPRYMNUS, Og.

a, b. 2 frontlets and horns. Shiré Highlands.

33. ÆPYCEROS MELAMPUS, Licht.

a, b. 2 skulls. Shiré Highlands.

34. OREOTRAGUS SALTATOR, Bodd.

a. Ad. sk. ♂. Fort Lister, Milanji, 3600 ft. 17/7/93.

"Found in pairs at the base of the high cliffs among rocks, and also on the higher ridges. Also on Mt. Zomba."—A. W.

35. MANIS TEMMINCKI, Smuts.

a. Ad. sk. Zomba.

P.S., March 17th, 1894.—Specimens representing the following species have arrived since the above was written, and may conveniently be added to the list here:—

36. *RHYNCHOCYON CIRNEI*, Pet.

a. Ad. sk. ♂. Zomba. 1/11/93.

37. *CANIS MESOMELAS*, Schr.

a. Ad. sk. ♂. Palombi R., Shirwa Plain. 11/10/93.

38. *NANOTRAGUS SCOPARIUS* (Schr.):

a, b. Ad. sks. Shirwa Plain. 10/93.

39. *CERVICAPRA ARUNDINUM* (Bodd.).

a. Ad. sk. ♂. Palombi R. 6/10/93.

2. On a Collection of Land-Shells from the Samui Islands, Gulf of Siam. By O. F. VON MOELLENDORFF, Ph.D.¹

[Received December 4, 1893.]

(Plate XVI.)

Mr. C. Roebelen, a well-known collector of orchids, to whom I am indebted for a great number of interesting shells from various parts of Eastern Asia, visited, in 1888 and 1892, the small group of islands south of Bangkok, named by the Siamese Ko-Samui, and situated near the coast of the Malay Peninsula at its narrowest part. The group, from which, so far as I know, no Land-Shells were hitherto known, consists of several small islands, the largest of which is called Samui. The rock seems to be calcareous throughout: at least one small island, called Kwangtong, is, according to Mr. Roebelen, one mass of apparently madreporic limestone.

As might have been expected from their geographical position, the fauna of the Samui group is essentially Malaccan, several species being common to the adjoining mainland, and most of the forms peculiar to the group having their nearest relatives amongst the species of Siam, Tenasserim, and Perak.

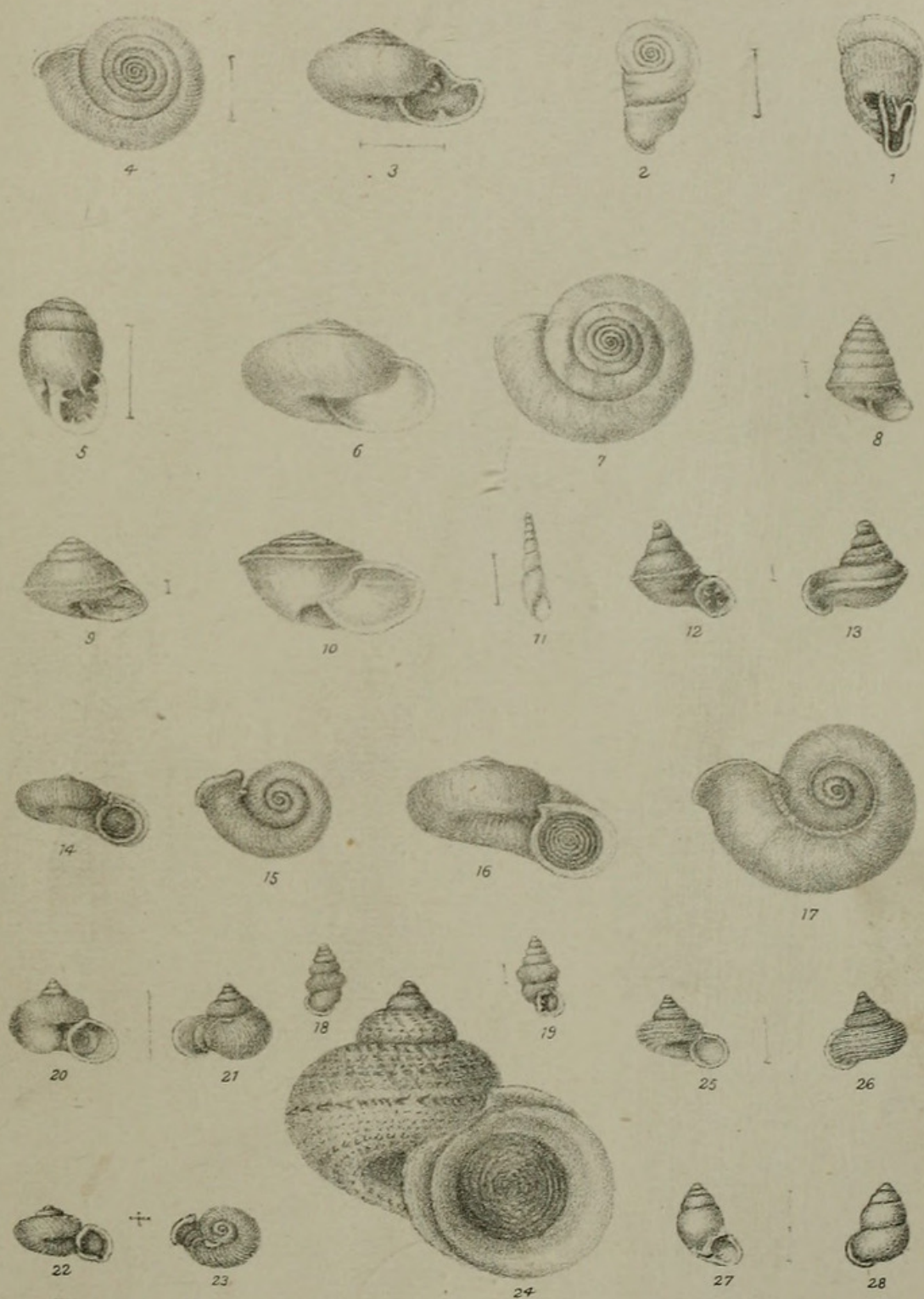
Fam. STREPTAXIDÆ.

1. *STREPTAXIS SIAMENSIS*, Pfr.

Streptaxis siamensis, Pfr. Mon. Hel. v. p. 449; Tryon, Man. Pulm. i. p. 79, t. xv. fig. 73.

Subsp. nov. *DEPRESSA*.—*Differt a typo spira magis depressa, anfractu ultimo magis distorto, penultimo subtus glabrato, dente*

¹ Communicated by Mr. G. B. SOWERBY, F.Z.S.



G.B. Sowerby del. et lith.

Hanhart imp.

LAND SHELLS FROM THE SAMUI ISLANDS.



columellari subobsoleto, nodiformi, dentibus in margine externo approximatis subæqualibus.

Diam. 10·5, *alt.* 7 millim.

By the flatter spire and the stronger distortion of the last whorl to the right this form appears at first sight to be very different; and as there are some differences in the dentition as well, I feel almost inclined to separate it specifically. Having only one specimen of the variety and but two of the type, I leave this question for further study.

2. STREPTAXIS MIRIFICUS, sp. nov. (Plate XVI. figs. 1, 2.)

T. umbilicata, depressa, subtilissime striatula, nitens, pellucida, hyalina. Anfractus $5\frac{1}{2}$, *planulati, superi spiram regularem perplanam apice fere immerso efficientes; penultimus ad peripheriam acute carinatus; ultimus maxime distortus, valde excentricus, basi peculiariter impressus, ad aperturam valde compressus, subtus subacute cristatus, sat deflexus. Apertura maxime obliqua, perangusta, irregulariter cordiformis; peristoma sat expansum, albo-labiatum. Lamella parietalis peralta, valida, longe intrans, superne bicurvis, utrinque in callum parietalem desinens.*

Diam. 9, *alt.* 4 millim.

A fine new species of the group of *S. exacutus*, Gld., and *S. hantleyanus*, Stol., both from Moulmein, distinguished by the entirely plane spire with almost immersed centre, the bifid parietal lamella, the compressed cordiform aperture, &c.

3. STREPTAXIS ROEBELENI, sp. nov. (Plate XVI. figs. 3, 4.)

T. aperte umbilicata, depressa, subtiliter arcuatim costulata, tenuis, pellucida, hyalina. Anfr. 6, *convexiusculi, sat lente accrescentes, superi spiram subregularem depresso-conoideam efficientes; penultimus vix, ultimus paullum distortus, basi subinflatus, glabratus, pone aperturam coarctatus. Apertura diagonalis, truncato-elliptica; peristoma sat expansum reflexiusculum, albo-labiatum, margine externo profunde sinuato, ad insertionem subito attenuato, recedente. Lamella parietalis valida triangulariter elevata, dentibus 3 lamelliformibus in margine externo et basali et nodulo in columella oppositis.*

Diam. maj. 8·5, *min.* 7, *alt.* 5·25 millim.

Forma major: diam. maj. 10, *min.* 8, *alt.* 5·5 millim.

Forma minor: „ 7·5 „ 6, „ 3·75 „

I find no recorded form of *Streptaxis* with which this interesting species could be united. According to the rather meagre description, *S. elisa*, Gld. (Proc. Bost. Soc. vi. 1856, p. 12; Pfr. Mon. Hel. v. p. 448), of the Mergui Archipelago, must be somewhat similar, but is larger, has one whorl more, the whorls are angulate or carinate, and there are two parietal lamellæ. Both species are by their depressed and almost regular form, with very little distortion, rather isolated among the Asiatic *Streptaxes*; in the somewhat

artificial division of the genus as given by Pfeiffer they might be classed in *Discartemon*.

4. *STREPTAXIS* (*OOPHANA*) *BULBULUS*, Morelet.

Streptaxis (*Oophana*) *bulbulus*, Tryon, Man. Pulm. i. p. 80, t. 15. figs. 41-43.

Described from Pulo Condor. The single specimen from the Samui group is rather more ventricose, the dimensions being 15:11.5 millim. instead of 16.5:11 in the type.

5. *STREPTAXIS* (*OOPHANA*) *STRANGULATUS*, sp. nov. (Plate XVI. fig. 5.)

T. aperte umbilicata, ovata, sat tenuis, subtiliter arcuatim costulata, sericina, hyalina; spira subregulariter ventroso-conica, apice obtuso, glabrato. Anfr. 6, sat convexi; ultimus paullum devians, circa umbilicum compressus, obtuse carinatus, pone aperturam subito coarctatus. Apertura parum obliqua, truncato-ovalis; peristoma late expansum, tenue, intus callosum, ad insertionem marginis externi attenuatum. Lamella parietalis valida, sat elevata; dentibus 5, uno in parte superiore collumellæ, 2 in margine basali, 2 in margine externo oppositis.

Alt. 10.5, diam. 7.5 millim.

Although certainly belonging to the group of the last species, this peculiar form differs at once in the almost regular, hardly deviating last whorl and the peculiar coarctation behind the mouth, which calls to mind the similar formation in certain species of *Alycæus* (*Dioryx*). The whorls also are more convex, the shell is thinner, the peristome broader, and there are 5 teeth instead of 3.

Mr. Ancey is quite right in considering his group *Oophana*, of which *S. bulbulus* is the type, to be a connecting-link between *Streptaxis* and *Ennea*. In fact *S. strangulatus* would at first sight rather be considered as an *Ennea* by many, on account of its regular shape. That this is, however, a *Streptaxis* and not an *Ennea* may be inferred from young specimens, which show no teeth, whilst all the young *Enneæ* are dentate.

Fam. NANINIDÆ.

6. *MACROCHLAMYS* *LIMBATA*, sp. nov. (Plate XVI. figs. 6, 7.)

T. perforata, discoideo-depressa, solidula, subtiliter striatula, lineis spiralibus nullis, pellucida, nitens, pallide corneo-flavescens, subregulariter corneo-strigata. Anfr. 6, convexiusculi, lente accrescentens, sutura profunda marginata discreti; ultimus non descendens, basi convexior, circa umbilicum excavatus. Apertura fere verticalis, late elliptica, valde excisa; peristoma extus rectum, acutum, margine columellari leviter reflexo, intus callo latiusculo, sat crasso limbatum.

Diam. maj. 19-22.5, min. 16.5-20, alt. 10.25-13.5 millim.

With all proper hesitation at introducing a new species of this genus, the very numerous species of which certainly require some weeding out, I cannot combine this form with any published *Macrochlamys*. Its nearest ally seems to be *M. resplendens*, Phil., var. *obesior*, Mart. (Ostas. Landschn. p. 72, t. xii. fig. 6), of Siam, which has a slight callosity behind the peristome; it is, however, only visible in very adult specimens and but a thin layer, whilst all my specimens of *M. limbata* show a distinct inner lip, which is repeated several times in the interior of the last whorl. Besides, the Samui form has a wider umbilicus, more convex whorls, equal colouring above and below, and a somewhat darker radial stripe.

7. *SITALA INSULARIS*, sp. nov. (Plate XVI. fig. 8.)

T. semiobtectae et angustissime perforatae, conico-turritae, subtiliter striatulae, lineis spiralibus valde confertis decussatae, nitens, corneo-hyalinae. Anfr. 8, planulati; ultimus ad peripheriam acute carinatus, non descendens. Apertura parum obliqua, rotundato-securiformis; peristoma rectum, acutum, margine columellari superne reflexo.

Diam. 3.75, alt. 4.75 millim.

By the great number of whorls, the regular conical shape, and the very narrow spiral sculpture this species is distinguished from all forms of *Sitala* known to me.

8. *KALIELLA SUBSCULPTA*, sp. nov. (Plate XVI. fig. 9.)

T. anguste perforata, globoso-conica, tenuis, subtiliter et valde confertim costulato-striata, corneo-fusca; spira conoidea, lateribus convexis. Anfr. 6, convexi; ultimus non descendens, basi glabratus, ad peripheriam obtuse angulatus. Apertura obliqua, late lunaris; peristoma rectum, acutum, margine columellari superne triangulariter reflexo.

Diam. 2.9, alt. 2.7 millim.

The only *Kaliella* described from the Malay Peninsula is *K. perakensis*, G.-Aust., which shows a similar outline, but is more distinctly carinate and only striated; it also has much less convex whorls. The sculpture of our species is similar to that of *K. sculpta*, Mdff., of Macao, which has otherwise a much lower spire and flatter whorls.

9. *HEMIGLYPTA SIAMENSIS* (Pfr.).

Known from Siam and Tenasserim. The spire of the Samui form is generally more elevated.

10. *ARIOPHANTA WEINKAUFFIANA INFLATA*, subsp. nov.

This variety differs from the Cochin-China type in the less distinct angulation of the periphery and the more convex, almost inflated base of the last whorl.

Fam. HELICIDÆ.

11. CHLORITIS PLATYTROPIS, sp. nov. (Plate XVI. fig. 10.)

T. sat aperte umbilicata, convexo-depressa, tenuis, transverse striatula, punctis impressis in seriebus regularibus dispositis sculpta, pilis brevissimis valde deciduis obsita, opaca, pallide corneo-brunnea; spira parum elevata, apice plano. Anfr. $4\frac{1}{2}$, fere plani, sutura impressa disjuncti; ultimus ad peripheriam carina bene exserta, obtusa, lata cinctus, basi convexus, medio gibbus, circa umbilicum infundibuliformem pervium compressus, subcristatus, ad aperturam breviter deflexus. Apertura fere diagonalis, irregulariter cordiformis; peristoma sat expansum, roseolabiatum, basi reflexiusculum, marginibus valde conniventibus, callo tenui junctis, columellari cum basali angulum obtusum formante.

Diam. maj. 20, alt. 11.5 millim.

Hab. prope vicum Chaya, in littore peninsulæ malaccanæ insulis Samui opposito.

Subsp. nov. SAMUIANA.—*Minor, tenuior, spira paullo magis convexa, peristomate minus expanso, vix labiato.*

Diam. 16.5, alt. 9 millim.

Hab. in insulis Samui.

This fine form belongs to the group of keeled *Chlorites*, for which de Morgan has created the unnecessary subgenus *Philidora* (cf. P. Z. S. 1891, p. 336), and is closely allied to *C. gabata*, Gld., of Mergui and Tenasserim. The type was found by Mr. Roebelen near Chaya, a village on the Malay Peninsula just opposite the Samui group within Siamese territory, the smaller variety on our islands.

12. PUPISOMA ORCELLA, Stol.

Pupisoma orcella, Stol. J. A. S. B. xlii. 1873, p. 33, t. ii. fig. 2.

The Samui examples differ from the Penang type merely in their somewhat darker colour and slightly more elevated spire.

That *Pupisoma* has nothing to do with *Pupa*, but belongs to the parentage of *Acanthinula* and *Zoogenetes* (*H. harpa*, Say), I have tried to prove elsewhere (Jahresber. Senckenb. nat. Ges. 1890, p. 223).

Fam. BULIMIDÆ.

13. AMPHIDROMUS MONILIFERUS, Gld.

Only one dead specimen was found, which seems to agree with the above-named species described from Tavoy.

Near Chaya Mr. Roebelen collected a fine variety of *A. annamiticus*, Cr. et Fisch., with rose-coloured apex which I name var. *roseotincta*.

Fam. STENOgyRIDÆ.

14. OPEAS GRACILE, Hutt.

15. OPEAS FILIFORME, sp. nov. (Plate XVI. fig. 11.)

T. rimata, gracillime turrita, tenuis, subtiliter et maxime confertim striatula, nitens, pellucida, albida; spira sensim attenuata, apice obtusulo. Anfr. 7½, convexiusculi, lente accrescentes, sutura sat impressa discreti. Apertura modice obliqua, anguste acuminato-ovalis; peristoma rectum, acutum, margine columellari incrassatulo reflexo.

Alt. 5.5, diam. 1.5 millim.

I do not know any similar small and slender species of *Opeas*; the comparatively great number of whorls show that it is adult.

Fam. PUPIDÆ.

16. VERTIGO (STAURODON) MORELETI, Brown.

Subsp. nov. SAMUIANA.

Differs from the Borneo and the Philippine-Island type (v. Jahresb. Senckenb. nat. Ges. 1890, p. 252) in the slightly more contracted shell and in the somewhat deeper groove behind the outer peristome.

17. HYPSELOSTOMA TRANSITANS, sp. nov. (Plate XVI. figs. 12, 13.)

T. umbilicata, turbinata, oblique striatula, fusca. Anfr. 4, convexi, spiram conicam apice papillari formantes; ultimus paulum distortus, antice non ascendens, breviter solutus et porrectus, ad peripheriam crista sat prominente, altera minore ad suturam cinctus, basi subgibber, circa umbilicum compressus. Apertura parum obliqua, rotundato-tetragona; peristoma continuum, tenue, expansum, haud reflexum. Lamella parietalis validiuscula, antice bifida, dentibus 2 in margine externo, 1 in basi et 1 in columella oppositis.

Diam. 2.75, alt. 2.66 millim.

This peculiar shell presents an especial interest inasmuch as it forms a decided transition from *Hypselostoma* to the Indian and Chinese *Boysidia*, Ancey, of which *Pupa hunanensis*, Gredl., is the type. As I have mentioned in the description of *Hypselostoma hungerfordianum* (P. Z. S. 1891, p. 338), the genus appears to be but an extreme development of the *Boysidia* type. *Boysidia strophostoma*, Mdff., of South China, shows already a slight distortion and detachment of the last whorl, which in the Samui species is much less developed than in the other forms of the genus. There can be no doubt, however, that it belongs to *Hypselostoma*, with which it has the peculiar quadrangular shape of the last whorl and the dentition of the aperture in common. *H. crossei*, Mor., of Tongkin seems to connect it with the other Malayan species.

18. *HYPSELOSTOMA STRIOLATUM*, sp. nov.

Owing to the bad state of preservation of the two specimens of this form, quite distinct from the preceding one, I cannot give a complete description of it. Its last whorl is much more detached than in *H. transitans* and distinctly bent upwards, and shows very distinct though minute spiral lines. The diameter is only 2·5 millim. It belongs to the group of *H. bensonianum* and *H. hungerfordianum*.

Fam. ASICULIDÆ.

19. *TRUNCATELLA VALIDA*, Pfr.20. *TRUNCATELLA SEMICOSTATA*, MOUSS.

Fam. CYCLOPHORIDÆ.

21. *OPISTHOPORUS SETOSUS*, sp. nov. (Plate XVI. figs. 14, 15.)

T. latissime umbilicata, discoidea, tenuis, transverse confertim costulato-striata, setis brevibus densis deciduis hirsuta, olivaceo-cornea; spira vix prominula, apice submucronato. Anfr. 4½, teretes, sutura profunda disjuncti; ultimus paululum descendens, pone aperturam tubulum suturalem brevem ad anfractum penultimum recurvatum gerens, tum subsolutus. Apertura sat obliqua, subcircularis; peristoma duplex, internum tenue, breviter porrectum, externum expansum, campanulatum, superne ad insertionem breviter auriculatum. Operculum extus fere planum, lamina calcarea anfr. 8 transverse costulo-striatis, sulco sat profundo ab interna tenui cornea separata.

Diam. maj. 14, min. 10·5, alt. 5·5 millim.

Forma conoidea: minor, arctius umbilicata, spira magis elevata, anfractus ultimus magis descendens, longius solutus.

Diam. 11·5, alt. 7 millim.

In size and general outline this species agrees somewhat with *O. corniculum* of Java, but the spire is still flatter, the position of the sutural tube is different, and the hirsuteness distinguishes it from the Javan and from all other known *Opisthopori*.

22. *RHIOSTOMA HOUSEI*, Haines.

Three specimens of a fine large *Rhiostoma* agree very well with the diagnosis of this Siamese species, of which I cannot compare either examples or figures. The largest specimen measures 28 millim. in diameter and is 16·5 high, the operculum is 8·5 millim. wide, 3 high.

23. *RHIOSTOMA ASIPHON*, sp. nov. (Plate XVI. figs. 16, 17.)

T. late et perspective umbilicata, convexo-depressa, solida, transverse plicato-striatula, cinerascens-brunnea, interdum indistincte marmorata et tæniata; spira parum elevata, apice subacuto. Anfr. 5, perconvexi; ultimus antice solutus et deflexus, in parte soluta superne albo-carinatus. Apertura obliqua, circularis; peristoma valde incrassatum, multiplicatum, superne intus leviter incisum, extus in alam recedentem haud tubulum formantem productum.

Operculum cyathiforme, subtestaceum, intus profundissime cylindrico-excavatum, læve, nitens, extus breviter cylindricum, tum semiglobosum, apice subplano, anfr. 12 marginibus lamellatim elevatis, in interstitiis oblique striati.

Diam. maj. 24.5, min. 18, alt. 13.5; operculi diam. 6, alt. 4 millim.

This very interesting form differs from all known species of *Rhiostoma* in the want of a sutural tube, whilst the operculum is quite typical. This is another proof that the formation of a tube, which is but an extreme development of the "wing" at the peristome of *Eucyclotus* and *Pterocyclus*, is of less systematic value than is generally supposed. The classification of operculate shells will have ultimately to rely upon the structure of the operculum chiefly, if not exclusively.

24. CYCLOPHORUS MALAYANUS, Bens.

Whilst Prof. von Martens is quite right in combining the so-called *C. malayanus* of the 'Conchologia Indica' and of Reeve with the very variable *C. aurantiacus*, Schum. (Journ. Linn. Soc., Zool. xxi. 1887, p. 159), I believe with him that the true *C. malayanus*, Bens., of Pulo Penang is a distinct species. A fine large *Cyclophorus* of the Samui group I consider to belong to it, although I cannot compare typical specimens. My largest example measures 48 by 39 millim.

25. CYCLOPHORUS DIPLOCHILUS, sp. nov. (Plate XVI. fig. 24.)

T. pro genere anguste umbilicata, subdepressa turbinata, solida, transverse leviter striatula, lineis spiralibus rugulosis decussata, pallide corneo-fusca, tæniis interruptis castaneis, interdum strigis castaneis flammulatis picta. Anfr. 4½, perconvexi, ad suturam subplanati; ultimus antice vix descendens. Apertura sat obliqua, circularis; peristoma duplex, externum album, late expansum, revolutum, marginibus callo junctis, columellari dilatato; internum aureum aut aurantiacum, valde nitens, continuum, late expansum, margine dextro valde dilatato, crassum, quasi multiplicatum, sulco ab externo separatum. Operculum normale. Diam. maj. 38, min. 28, alt. 31; diam. apert. c. perist. 24, intus 14 millim.

Forma minor: diam. maj. 30, min. 22.5, alt. 25; diam. apert. 18, intus 11 millim.

At first I believed this fine shell to be *C. cucullatus*, Gld., of Mergui, of which no figure has been published, and which v. Martens in his able paper on the Mergui Archipelago does not mention. According to the diagnosis of Gould's species as given by Pfeiffer (Mon. Pneum. suppl. i. p. 44), however, there appear to exist sufficient differences to justify the separation of the two forms specifically. *C. cucullatus* is considerably smaller, white, the last whorl subangulate, the columellar margin not dilatate, the outer peristome is only called "reflexiusculum," whilst in my species it is strongly recurved, &c. Otherwise the formation of

the peristome, the inner yellow or orange lip contrasting with the white outer one, the widening of the peristome to the right, &c., must be analogous according to Pfeiffer's description.

26. *LAGOCHEILUS LIRATULUS*, sp. nov. (Plate XVI. figs. 25, 26.)

T. anguste umbilicata, turbinata, sat tenuis, nitidula, transverse subtiliter striatula, lineis spiralibus elevatis sat confertis usque ad umbilicum cincta, corneo-flava, obsolete strigata. Anfr. 5½, convexi; ultimus antice paulum descendens. Apertura sat obliqua, fere circularis; peristoma subduplex, tenue, breviter expansum, haud reflexum, ad insertionem breviter excisum.

Diam. maj. 5, min. 4.25, alt. 5 millim.

Differs from *L. townsendianus*, Crosse, of Perak, in the smaller size, the higher and more pointed spire, the more convex whorls, the narrower umbilicus, the want of angulation in the last whorl, and the equally distant, uniform spiral lines.

Fam. DIPLOMMATINIDÆ.

27. *ALYCÆUS ROEBELENI*, sp. nov. (Plate XVI. figs. 20, 21.)

T. modice umbilicata, subdepressa turbinata, tenuis, pellucida, costulo-striata, lineis spiralibus microscopicis decussata, lacte flava; spira modice elevata, lateribus subconcavis, apice obtusulo glabrato. Anfractus 5, perconvexi, ad suturam profunde impressam subplanati; ultimus postice spiram altitudine multo superans, valde inflatus, gibber, 4 millim. pone aperturam valde constrictus, tum denuo dilatatus, ad aperturam sat deflexus. Apertura diagonalis, subcircularis; peristoma continuum, vix duplicatum, sat expansum, haud reflexum, flavo-labiatum. Operculum corneum, valde concavum, anfr. 6. Tubulus suturalis brevis, appressus.

Diam. maj. 9.5, alt. 7 millim.

Var. minor: *spira paullo magis elevata. Diam. 8.5, alt. 7 millim.*

Although nearly related to *A. perakensis*, Crosse, this form must, I think, be separated specifically. It is larger, much less elevated, more widely umbilicated, the last whorl comparatively higher, about four-sevenths of the total altitude, and much more tumid, more deflected at the end, and therefore the plane of the aperture much more oblique, the constriction deeper, the peristome hardly double, not so thick, and yellow instead of white. Besides there is half a whorl less, as I count distinctly 5½ in *A. perakensis*. Unless transitory forms exist in the, as yet, little-explored Malay Peninsula, I think these differences sufficient to consider the Samui race a distinct species.

28. *ALYCÆUS CANALICULATUS*, sp. nov. (Plate XVI. figs. 22, 23.)

T. sat aperte umbilicata, depressa, solidula, confertim costulata, pallide cornea; spira parum elevata, convexo-conoidea. Anfr. 3½, convexi; ultimus a medio inflatus, subgibber, pone apertu-

ram valde constrictus, tum campanulatus, sublævigatus, in media parte lævigata obtuse cristatus. Apertura diagonalis, subcircularis; peristoma duplex, externum sat expansum, internum continuum, valde porrectum incrassatulum, superne et basi effusum et subcanaliculatum.

Diam. maj. 2.25, min. 1.75, alt. 1.2 millim.

Evidently a near ally of the small Perak species, such as *A. microdiscus*, m., but at once distinguished by the peculiar grooves near the upper insertion and at the base of the peristome.

29. DIPLOMMATINA (SINICA) SAMUIANA, sp. nov. (Plate XVI. figs. 18, 19.)

T. dextrorsa, elongate ovato-conica, confertim costulata, pallide cornea. Anfr. 7, modice convexi, superi 5 spiram subregulariter conicam efficientes; penultimus magnus; ultimus angustior, paululum distortus, initio constrictus, antice ascendens. Apertura verticalis, subcircularis; peristoma duplex, externum modice expansum, superne interruptum, internum incrassatulum, sat porrectum, basi columella angulum distinctum formans. Lamella columellaris humilis, palatalis longiuscula, subhorizontalis, supra columellam conspicua.

Alt. 2.5, diam. 1.33 millim.

Fam. PUPINIDÆ.

30. PUPINA ARTATA, Bens.

31. PUPINA PALLENS, sp. nov. (Plate XVI. figs. 27, 28.)

T. conoideo-ovata, lævis, nitens, pallide corneo-brunnea. Anfr. 6, convexiusculi; ultimus sat distortus, supra aperturam applanatus, antice breviter ascendens. Apertura paululum retrorsum inclinata, circularis; peristoma expansiusculum, haud reflexum, margo externus ad insertionem attenuatus, recedens cum lamella parietali triangulari valida canalem superum formans, basalis et columellaris incrassati et dilatati. Canalis inferus angustus, horizontalis, postice in foramen subcirculare desinens.

Alt. 8, diam. 5.5 millim.

This somewhat difficult form agrees in size with *P. arula*, Bens., of Perak and Tenasserim, but differs in the more obtuse spire, the more distorted last whorl, and consequently the aperture placed more to the right and protracted at the base, the thinner outer peristome, the broader columella, the broad triangular parietal lamella, and the narrower lower incision.

Fam. HYDROCENIDÆ.

32. GEORISSA MONTEROSATIANA, Nev. et G.-A.

Subsp. nov. SAMUIANA.—*Minor, anfr. magis convexis. Alt. 2.5, diam. 1.5 millim.*

A slight modification of the Perak type.

EXPLANATION OF PLATE XVI.

- Figs. 1, 2. *Streptaxis mirificus*, p. 147.
 3, 4. — *roebeleni*, p. 147.
 5. — (*Oophana*) *strangulatus*, p. 148.
 6, 7. *Macrochlamys limbata*, p. 148.
 8. *Sitala insularis*, p. 149.
 9. *Kaliella subsculpta*, p. 149.
 10. *Chloritis platytropis*, p. 150.
 11. *Opeas filiforme*, p. 151.
 12, 13. *Hypselostoma transitans*, p. 151.
 14, 15. *Opisthoporus setosus*, p. 152.
 16, 17. *Rhiostoma asiphon*, p. 152.
 18, 19. *Diplommata samuiana*, p. 155.
 20, 21. *Alycæus roebeleni*, p. 154.
 22, 23. — *canaliculatus*, p. 154.
 24. *Cyclophorus diplochilus*, p. 153.
 25, 26. *Lagocheilus liratulus*, p. 154.
 27, 28. *Pupina pallens*, p. 155.

3. A List of the Hemiptera-Heteroptera of the Families
Anthocoridae and *Ceratocombidae* collected by Mr. H. H.
 Smith in the Island of St. Vincent; with Descriptions of
 New Genera and Species. By P. R. UHLER.¹

[Received January 22, 1894.]

A. List of Species of which specimens were obtained.

ANTHOCORIDÆ.

Lasiochilus pallidulus, Reuter.
 — *variabilis*, Uhler.
 — *pictus*, sp. nov.
 — *fraternus*, Uhler.
Piezostethus sordidus, Reuter.
Triphleps perpunctatus, Reuter.
Brachysteles pallidus, Reuter.
Cardiastethus elegans, Uhler.
 — *consimilis*, Uhler.

CERATOCOMBIDÆ.

Ceratocombus brasiliensis, Reuter.
 — *minutus*, Uhler.
Cryptostemma fasciata, Uhler.
Schizoptera flavipes, Reuter.
 — *scutellata*, sp. nov.
 — *capitata*, sp. nov.
Ommatides (gen. nov.) *insignis*, sp.
 nov.
Oncerodes (gen. nov.) *robusta*, sp.
 nov.

¹ Communicated by Dr. D. SHARP, F.R.S., F.Z.S., on behalf of the West India Islands Committee.

[In the list of St. Vincent Hemiptera recently communicated to the Society (see P. Z. S. 1893, p. 705) it was mentioned that Prof. Uhler had been obliged to leave the *Anthocoridae* and *Ceratocombidae* undetermined, the material sent to him being inadequate for the study of such difficult insects. Since then Prof. Uhler has received from the Committee additional material—chiefly from the neighbouring island of Grenada—which has enabled him to complete his enumeration of the two groups of Heteroptera in question, and I now communicate to the Society the results of this part of his work. We hope that the list of Hemiptera-Heteroptera of Grenada will shortly be in the possession of the Committee.—D. S.]

B. *Descriptions of New Genera and Species.*

Fam. ANTHOCORIDÆ.

Genus LASIOCHILUS.

LASIOCHILUS PICTUS, sp. nov.

In form similar to *L. nebulosus*, Uhler, but somewhat narrower, with the head a little more tapering. Above pale rufo-flavous and testaceous, beneath pale rufo-piceous. Head moderately short, rufo-testaceous, minutely rugulose in front, with a triangular impressed line between the eyes, near which the surface is slightly granulated; the neck is a little swollen, highly polished, slightly wider than the space between the eyes, bounded in front by an impressed line with some punctures; the front narrower and longer than the neck, with the sutures bounding the tylus deeply defined; antennæ moderately slender, not setaceous, testaceous, a little dusky, the second joint much the longest, a little thicker towards the tip, the third joint much more slender, a little shorter than the fourth, which is a little thicker than it; rostrum pale fuscous, slender, reaching as far as the middle coxæ. Pronotum trapezoidal, wider than long, with the lateral oblique margin pale testaceous, reflexed, with the anterior angle a little rounded; surface rufo-testaceous, polished, remotely pubescent, the callosity of the anterior lobe long, convexly prominent; collum scarcely projecting beyond the side of the head, narrow, but distinct; the posterior lobe large, punctate, the punctures continuing forward on the sides, the posterior margin hardly sinuated, with the humeral angles callous, pale, and acute. Scutellum pale reddish brown, depressed and punctate behind the middle. Hemelytra pale testaceous, minutely pubescent, closely punctate except upon the posterior part of the corium; the cuneal portion smoke-brown, but darker exteriorly, and dull testaceous on the costal border; posterior margin of the corium also brown; membrane soiled whitish. Legs dusky testaceous. Venter clouded with dusky brown, a little paler exteriorly, the posterior margins of the segments fringed with yellowish hairs, and most of the ventral surface spread with fine yellowish pubescence.

Length to tip of abdomen 2 millim.; width of base of pronotum $\frac{3}{4}$ millim.

One or two specimens were found on the leeward side of St. Vincent, and others were taken in the island of Grenada.

Fam. CERATOCOMBIDÆ.

Genus SCHIZOPTERA, Fieber.

SCHIZOPTERA SCUTELLATA, sp. nov.

In form similar to *S. rutteri*, Reuter, but with the membrane more tapering posteriorly. Subconic-ovate, black, opaque, minutely pubescent, with a broad orange band covering the clavus, except

directly at base, the costa, and base of the two medial veins of the corium; the legs and antennæ yellow. Head broad, convex, narrower than the front of the pronotum, but with the eyes prominent and extending beyond the pronotum; antennæ reaching to the tip of corium, the basal joints thick, the second one longer than the first, and the remaining ones thread-like, set with fine hairs. Pronotum convexly arched, a little wrinkled anteriorly, steeply sloping forwards, minutely and closely scabrous, with the posterior margin a little decurved, and the humeri moderately prominent; the scutellum small, dull black. Clavus raised like a tabula; the veins of the corium coarse and prominent; the membrane long, dull black, with the medial longitudinal veins long, parallel, and continued to the tip.

Length to tip of membrane $1\frac{1}{2}$ millim.; width of pronotum $\frac{3}{4}$ millim.

Only one specimen was secured on the island, and as it is not labelled, nothing can be stated concerning its *habitat*.

SCHIZOPTERA CAPITATA, sp. nov.

This form, omitting the head, is nearly like *S. flavipes*, Reuter. The head departs remarkably from all the related species in being long, conical, and acutely tapering at tip; the body, head, pronotum, legs, and scutellum are pale fulvous, with the coriaceous part of the hemelytra velvety black, and the membrane and apex of the corium whitish yellow. Eyes small, lateral, subglobose, blackish; antennæ pale yellowish, reaching beyond the tip of the corium, the basal joint shorter than the second, the second a little thickened at tip, with the remaining joints very slender, dusky, and minutely fringed; rostrum projecting from behind the middle of the gula, pale testaceous, reaching to the middle coxæ, and a little piceous at tip. Pronotum transverse, trapezoidal, flat above, steeply sloping, with the lateral margins obliquely tapering and the margin a little reflexed; the anterior margin, as wide as the space between the eyes, abutting against a collum which stands between the eyes; the posterior margin almost straight, with the humeri subacute. Scutellum crescentiform, elevated at base, contracted beyond the base and acutely tapering to the tip. Corium somewhat greyish pubescent, the veins distinct, the cubital one leaving a wide areole in the interval out to the costa and keeping on to tip of membrane; the costal vein tawny towards the tip, the vein next inward running parallel with this and equally continuous.

Length to tip of membrane $1\frac{1}{4}$ millim.; width of pronotum $\frac{2}{3}$ millim.

Only one specimen was secured. It was found at locality No. 6.

In this form the hemelytra are very much wider than the abdomen and longer than usual, with the costal margin curved nearly the same as in *S. flavipes*, Reut. Mr. Reuter does not include in this genus any species with produced head; but the characters in this species, apart from those of the head, seem distinctly to connect it with the genus to which it is now referred.

OMMATIDES, gen. nov.

Coleopterine, closely resembling a short thick *Geocoris*. Eyes very large, oval, projecting diagonally against the anterior corner of the pronotum; front of the head short, bluntly tumid, with the face vertical, protracted downward, and having long lobate cheeks which converge over the base of the rostrum; antennæ filiform beyond the second joint, the basal joint shorter and a little thicker than the second; rostrum thick at base, short, tapering, quite slender towards the tip, reaching almost to the middle coxæ. Pronotum very short, almost annular, with the sides rounded off anteriorly to admit the form of the eyes, the posterior margin almost straight. The two forward pairs of legs placed near together; the anterior tibiæ greatly thickened at tip and armed with long spines. Scutellum very short, transverse, triangular. Hemelytra high convex, extending amply over the abdomen and much longer than it; the costal border moderately curved, with the middle areole moderately wide, and the thick cubital vein running back parallel with the next inner vein all the way to tip of membrane, and with the two exterior transverse veins as in *Schizoptera*.

OMMATIDES INSIGNIS, sp. nov.

Ovate, blunt and wide in front; orange, with the pronotum, scutellum, and a broad band behind the scutellum, covering the membrane, blue-black. The head reddish brown above, yellow below the origin of the tylus, obsoletely scabrous, very minutely pubescent. Legs polished, stout, bright yellow, remotely hairy. Pronotum moderately arched, opaque, a little scabrous. Hemelytra thick, opaque, velvety; the membrane but little thinner than the corium, with the inner margin straight, not overlapping at tip, the apex a little tapering and rounded at tip.

Length to tip of membrane 1 millim.; width of pronotum $\frac{5}{8}$ millim.

A single specimen of this peculiar little insect was taken, but no record is given concerning the place where it was found.

ONCERODES, gen. nov.

Coleopterine, and resembling an *Issus* in form; the hemelytra particularly wide and subglobose, blunt at the anterior end. Head nearly vertical, short and broad, moderately convex before the line of the eyes, transversely impressed between them; the cheeks separated by deep vertical lines, the tylus nearly linear; rostrum very short and thick, tapering at tip, fitting very compactly into the sternum, reaching to tip of anterior coxæ; antennæ with the two basal joints thick, the second joint a little shorter and not so thick as the first, the remaining joints thread-like, finely pubescent. Pronotum transverse, nearly crescent-shaped, moderately arched, having the anterior angles rounded off to fit the curve of the eyes. Scutellum acutely triangular, much longer than wide. Hemelytra but little longer than wide, suborbicular, narrower at base, corresponding to the width of the pronotum; the veins coarse and

prominent, longitudinal, the two middle ones connected on the disk and sending back a branch parallel to the others, all of which continue out to the tip; suture of the clavus deeply defined, the clavus wide and nearly triangular. Legs stout, placed close together.

ONCERODES ROBUSTA, sp. nov.

Short, thick, very convex, opaque bluish-black, with a velvety aspect above. Base of the hemelytra, including the scutellum, clavus, and a spot expanded on the costal margin, bright yellow. Head transversely rugulose, the front piceous, with the throat and antennæ dull honey-yellow; the rostrum a little darker. Legs thick and short, honey-yellow. Venter dull black, rufo-piceous on the genital pieces.

Length to tip of hemelytra $1\frac{1}{4}$ millim.; width of pronotum $\frac{1}{2}$ millim.; width of hemelytra $\frac{3}{4}$ millim.

A single specimen was found on the leeward side of the island.

In respect to form of body and longitudinal direction of veins on the hemelytra this insect bears some relation to *Hypselosoma*, Reuter; but in all other respects it seems sufficiently different to constitute a separate genus.

4. On the Affinities of the Steganopodes.

By Dr. R. W. SHUFELDT, C.M.Z.S.

[Received January 25, 1894.]

Recently I have written an account of the osteology of all the North-American Steganopodes, illustrating it with many figures of the representative species. This, extending as it would to between one hundred and two hundred pages, is altogether of too great length to submit on the present occasion; it may be of interest, however, to offer some of the conclusions arrived at with respect to the relationships of the birds constituting that suborder.

Basing then, as we do, our judgment on a study of the skeletons of the Steganopodes, we are justified in regarding them as being composed of three superfamilies. These may be designated as, first, the *Pelecanoidea*; second, the *Phaëthontoidea*; and third and lastly, the *Fregatoidea*.

Arranging these, and the North-American families of them, with their genera, a taxonomic scheme on such a basis would stand thus:—

SUPERFAMILIES.	FAMILIES.	GENERA.
Pelecanoidea.	Pelecanidæ.	<i>Pelecanus</i> .
		<i>Phalacrocorax</i> .
Phaëthontoidea.	Phaëthontidæ.	<i>Anhinga</i> .
		<i>Sula</i> .
Fregatoidea.	Fregatidæ.	<i>Phaëthon</i> .
		<i>Fregata</i> .



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