

# RECORDS

of the

# INDIAN MUSEUM

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	PAGE
XII. Gordiens du Musée Indien. <i>L. Camerano</i> ... ..	113
XIII. The Fauna of Brackish Ponds at Port Canning, Lower Bengal. Part IX. <i>Rev. T. R. R. Stebbing, M.A., F.R.S.</i> ... ..	119
XIV. Description of a new species of <i>Danio</i> from Lower Burma. <i>B. L. Chaudhuri, B.A., B.Sc.</i> ... ..	125
XV. <i>Rhynchota Malayana</i> . Part I. <i>W. L. Distant</i> ... ..	127
XVI. <i>Cimex rotundatus</i> , <i>Signoret</i> . <i>Capt. W. S. Patton, I.M.S.</i> ...	153
XVII. Notes on Freshwater Sponges. No. IX. <i>N. Annandale, D.Sc.</i>	157
XVIII. Fruit Bats of the genus <i>Pteropus</i> inhabiting the Andaman and Nicobar Archipelagos. <i>Geo. E. Mason</i> ... ..	159
XIX. A new species of Sun-Bird obtained near Darjiling. <i>T. Ben- tham</i> ... ..	167
XX. Three Indian Phylactolæmata. <i>N. Annandale, D.Sc.</i> ...	169
XXI. On two new species of Eagle-Rays ( <i>Myliobatidae</i> ). <i>Capt. R. E. Lloyd, B.Sc., I.M.S.</i> ... ..	175
XXII. Description of a new species of the genus <i>Sesarma</i> , <i>Say.</i> , from the Andaman Islands. <i>Dr. J. G. de Man</i> ... ..	181
XXIII. Descriptions of new species of land, marine and freshwater shells from the Andaman Islands. <i>H. B. Preston, F.Z.S.</i> ...	187

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## XII.—GORDIENS DU MUSEE INDIEN.

Par LORENZO CAMERANO, Professeur à l'Université de Turin.

Monsieur N. Annandale, Superintendant du Musée d'Histoire Naturelle Indien de Calcutta, a eu l'obligeance de me soumettre la collection de Gordiens appartenant au Musée. L'étude de cette collection sera certainement utile pour la connaissance de la distribution géographique de plusieurs espèces déjà connues et elle fera connaître aussi quelques espèces nouvelles pour la science.

### *Chordodes siamensis*, Camer.

Assam : J. Macdonald.

♂ Longueur maxima, m. 0'148. Largeur maxima, m. 0'001.  
Exemplaire trouvé dans une "*Mantis*."  
L'animal est noir.

Pegu.

♀ Longueur maxima, m. 0'302. Largeur maxima, m. 0'0015.  
L'animal est d'un brun clair.

J'ai décrit cette espèce d'après un exemplaire femelle du Siam ("*Nuove specie di Gordii del Basso Siam*," *Boll. dei Musei di Zool. e Anat. Comp. di Torino*, vol. xviii, n. 437, 1903). Je décris le mâle de cette espèce, qui n'a pas encore été décrit. La forme générale du corps, de l'extrémité antérieure et de l'extrémité postérieure est celle qui caractérise les espèces du genre *Chordodes*. L'animal est noir. La couche cuticulaire extérieure a la même structure que celle de la femelle.

### *Chordodes annandalei*, sp. nov.

Chitlong, Nepal : Museum Collector (Hodgart). x-07.

♂ Longueur maxima, m. 0'085. Largeur maxima, m. 0'0005.  
♂ " " m. 0'090. " " m. 0'0005.  
♀ " " m. 0'138. " " m. 0'0007.

Ces trois exemplaires ont été trouvés dans un individu de "*Mantis*."

Le corps de la femelle est de couleur brune; celui du mâle est de couleur brun-noirâtre.

La forme générale du corps, est celle qui caractérise les espèces du genre *Chordodes*. Chez le mâle, l'extrémité postérieure est entière avec un très petit sillon terminal antéro-postérieur. La couche cuticulaire extérieure du mâle a la même structure que celle de la femelle. Les aréoles papillaires sont d'une seule qualité.

Elles sont coniques, très rapprochées entre elles et souvent elles sont pourvues de formations en forme de très petits poils réfringents. La longueur des aréoles papillaires est 10—15  $\mu$  : la largeur est 3—4—5  $\mu$ .

Pour ce qui est du système des aréoles papillaires de la couche cuticulaire extérieure cette espèce appartient au groupe d'espèces du genre *Chordodes* qui ont une seule qualité d'aréoles papillaires, telles que : *Ch. moluccanus*, Roemer, *Ch. liguligerus*, Roemer, *Ch. weberi*, Villot. Elle diffère de *Ch. liguligerus* par les caractères de la couche extérieure de la cuticule. Dans cette espèce les aréoles cuticulaires sont très longues, *liguliformes* (long. 30—36  $\mu$ ). Elle diffère de *Ch. moluccanus*, qui présente les aréoles papillaires basses, arrondies, et avec une surface bouslée.

Elle diffère enfin de *Ch. weberi*, qui présente les aréoles papillaires aplaties ou arrondies.

*Chordodes giglio-tosi*, sp. nov.

Purneah, N. Bengal : W Shillingford.

♀ Longueur maxima, m. 0.355. Largeur maxima, m. 0.001.

La forme générale du corps, de l'extrémité antérieure et de l'extrémité postérieure est celle qui caractérise les espèces du genre *Chordodes*. L'animal est brun.

La couche cuticulaire extérieure présente deux sortes d'aréoles papillaires. Les aréoles papillaires de la première sorte sont légèrement relevées, un peu arrondies et plus basses que les suivantes. Elles sont couvertes de granulations très fines.

Les aréoles de la deuxième sorte sont plus grosses, plus convexes et sont pourvues d'un prolongement clair en forme de tube un peu conique et légèrement recourbé. Ces aréoles sont disposées çà et là, isolées ou quelquefois rapprochées entre elles deux à deux.

Les aréoles de la deuxième sorte ont à leur base 10  $\mu$  de largeur environ. Les tubes ont une longueur de 12—15  $\mu$  environ, et un diamètre transversal de 2—3  $\mu$  environ.

Cette espèce est bien caractérisée par la structure de sa cuticule extérieure.

*Parachordodes pustulosus*, Baird.

Yarkand : F. Stoliczka.

Un exemplaire ♀

Longueur maxima, m. 0.12. Largeur maxima, m. 0.0008.

Couleur jaune clair.

Cette espèce est très répandue. Elle se trouve en Angleterre, France, Allemagne, Italié, dans le désert des Kirgisi, dans la Chine méridionale et en plusieurs localités de l'Asie Centrale. L'expédition Russe au Tibet (1899—1901) l'a trouvée à Entok-gomba dans une source près du fleuve Dza-Eju (Bassin du Fleuve Bleu).

*Confr.* L. Camerano, "Monografia dei Gordii," *Mem. R. Accad. Scienze Torino*, ser. ii, vol. xlvii (1897); "Gordiens nouveaux ou

peu connus du Musée Zoologique de l'Acad. Imp. Petersb., Sc. St. Pétersbourg," *Annuaire du Mus. Zool. Acad. Imp. St. Pétersb.*, t. i (1896), pg. 117-125, et t. viii (1903), pg. 22-29.

*Gordius fulgur*, Baird.

Tavoy : Dr. Forster.

♂ Longueur maxima, m. 0.76. Largeur maxima, m. 0.001.

♀ " " m. 1.18 " " m. 0.001.

Le corps est de couleur jaune clair. Le collier noir est à peine marqué. Le corps de la femelle est luisant : celui de mâle est moins bien conservé. Les lobes de l'extrémité postérieure du mâle sont courts et arrondis à l'extrémité. La lame postcloacale est grande et arrondie.

Andamans : D. A. de Roepstorff.

♀ Longueur maxima, m. 0.72. Largeur maxima, m. 0.001.

Le corps est de couleur jaune-brun. Le collier noir n'est pas marqué.

Je rapporte cet exemplaire avec quelques doutes au *G. fulgur*, Baird. A cette espèce il ressemble par sa longueur. On sait d'autre part que la détermination spécifique des femelles des espèces du genre *Gordius* qui ont la couche cuticulaire extérieure lisse est souvent très difficile.

Le *Gordius fulgur* est l'espèce qui peut présenter la plus grande longueur que l'on connaisse chez les Gordiens. On l'a signalée dans les localités suivantes : Batjan, Celebes, Nepal, Japan, Birmanie.

*Gordius doriae*, Camer.

Bagracote, Siliguri, N. Bengal : W Shillingford. 4-i-83.

♂ Longueur maxima, m. 0.63. Largeur maxima, m. 0.0015.

Le corps est de couleur jaune-brun. Le collier noir est bien marqué : les bandes longitudinales brunes sont au contraire peu marquées.

♀ Longueur maxima, m. 0.36. Largeur maxima, m. 0.002.

Le corps est de couleur jaune-brun. Le collier noir est bien marqué. Il n'y a pas de bandes longitudinales brunes.

Birch Hill, Darjiling : Dr. F. Birch. 20-xii-81.

♀ Longueur maxima, m. 0.215. Largeur maxima, m. 0.0017.

Le corps est de couleur brun. Le collier noir est bien marqué. Il n'y a pas de bandes longitudinales brunes.

Darjiling : Col. A. A. A. Kinloch. 12-ix-85.

♂ Longueur maxima, m. 0.365. Largeur maxima, m. 0.0015.

Le corps est de couleur jaune-brun clair. Le collier noir et les bandes longitudinales sont peu marqués.

Darjiling.

♂ Longueur maxima, m. 0.30. Largeur maxima, m. 0.0008.

Le corps est de couleur jaunâtre. Le collier et les bandes longitudinales sont assez foncés.

Pegu.

♂ Longueur maxima, m. 0·33. Largeur maxima, m. 0·001.

♀ „ „ m. 0·46. „ „ m. 0·001.

Le corps est de couleur jaunâtre. Le collier et les bandes longitudinales sont peu foncés.

Cette espèce a été signalée à Cobapo (Birmanie) et à Perak (Malacca).

*Confr.* L. Camerano, "Monografia dei Gordii," *Mem. R. Accad. Sc. Torino*, ser. ii, vol. xlvii (1897); "Gordii della Malasia e del Messica," *Ath. Accad. Scienze Torino*, vol. xxxiv, 1899.

*Gordius paronæ*, Camer.

Darjiling : D. Paterson.

♂ Longueur maxima, m. 0·37. Largeur maxima, m. 0·001.

Le corps est de couleur brun. Il n'y a pas de collier noir et de bandes longitudinales brunes. Les lobes de l'extrémité postérieure sont plus clairs en dessous. L'extrémité antérieure est blanchâtre.

Sikkim.

♀ Longueur maxima, m. 0·43. Largeur maxima, m. 0·0015.

Le corps est de couleur brun-foncé. Le collier noir et les bandes longitudinales brunes manquent.

Asiatic Society of Bengal (sans localité).

♀ Longueur maxima, m. 0·385. Largeur maxima, m. 0·0015.

Couleur du corps, collier et bandes longitudinales comme dans l'individu de Sikkim.

Tura, Garo Hills : Williamson.

♀ Longueur maxima, m. 0·30. Largeur maxima, m. 0·0015.

Couleur du corps, collier et bandes longitudinales comme dans l'individu de Sikkim.

? India (sans localité précise).

♀ Longueur, m. 0·385 à m. 0·635. Largeur, m. 0·001 à m. 0·0015.

♂ Longueur, m. 0·232 à m. 0·275. Largeur, m. 0·0008 à m. 0·001. Nombreux exemplaires.

La couleur du corps est brun-noir.

J'ai décrit cette espèce d'après des exemplaires de Kota Bharu (Siam). Elle est très variable par sa longueur et par sa coloration. Les exemplaires en bon état de conservation et avec une coloration foncée sont quelque peu iridescents.

*Gordius zavattarii*, sp. nov.

Darjiling.

♂ Longueur maxima, m. 0.295. Largeur maxima, m. 0.0006.

Coloration générale jaune clair. Collier noir bien marqué. Bandes longitudinales noirâtres. Les lobes de l'extrémité postérieure sont longs m. 0.0005 environ, arrondie à leur extrémité, peu divergents. La lame postcloacale est bien développée, noirâtre et presque recourbée en ogive.

La couche cuticulaire extérieure n'est pas aréolée et présente de très petites formations réfringentes (long. 3—4  $\mu$ ) disposées çà et là et presque toujours au milieu des espaces en losange qui sont limités par les lignes croisées caractéristiques de la cuticule des espèces du genre *Gordius*.

Cette espèce a quelque ressemblance avec le *Gordius aëneus*, Villot (de Venezuela), pour ce qui est de la structure de la cuticule : mais elle en diffère par l'absence du collier noir et par la forme de la lame postcloacale.

*Paragordius* sp. ?

Darjiling Water-Works : Chairman, Darjiling Municipality.

Un exemplaire ♂ en mauvais état de conservation.



# XIII.—THE FAUNA OF BRACKISH PONDS AT PORT CANNING, LOWER BENGAL

## PART IX.—A NEW SPECIES OF AMPHIPODA.

By the Rev. THOMAS R. R. STEBBING, M.A., F.R.S., F.L.S., F.Z.S.

In the year 1904 Professor Coutière defined a new genus of Amphipoda, with description and figures of the typical species, *Grandidierella mahafalensis*. The specimens described had been collected two or three years earlier by Mons. G. Grandidier in Madagascar. They came from the Lake Tsimanampetsotsa in a previously unexplored region of the Mahafaly country. The lake in question is a long lagoon-like depression between latitude  $24^{\circ}$  and  $24^{\circ}30'$  S. and in longitude  $44^{\circ}$  E., about six miles from the west coast, and no longer possessing communication with the sea. Its salinity, varying with the rainfall, is greater than that of the sea during the dry season, and its fauna appears to be very poor (Coutière, *loc. cit. infra*).

Professor Coutière expressed an expectation that marine examples of his singular new species would be forthcoming on the west coast of Madagascar. This discovery has apparently not yet been made, but what has actually happened is perhaps of even greater interest. For the species about to be described, from brackish ponds in Lower Bengal, displays the very closest relationship to the one so recently found in a salt lake of Madagascar. Their differences may be considered to prove that the two species have been for a long time isolated one from the other. Yet, whatever the interval in chronology, the vast intervening space of ocean has left unobliterated and in fact unobscured the evidence of a common ancestry.

That the two species have become clearly distinct will presently be shown by characters of the antennæ, upper lip, mandibles, and gnathopods. Mons. Coutière has, in an interesting manner, compared his genus and species with *Dryopoides*, Stebbing; *Unciola*, Say.; *Chevreuxius grandimanus*, Bouvier; and *Camacho bathyplous*, Stebbing. The last-named species, reported in the "Challenger" dredgings to have come from a depth of 1,100 fathoms, has since been dredged off South Africa in 47 fathoms.

### Fam. COROPHIIDÆ.

1906. *Corophiidae*, Stebbing, *Das Tierreich*, "Amphipoda Gammaridea," Lieferung 21, pp. 662, 739.

In the key to the genera of this family supplied under the foregoing reference, M. Coutière's genus, with which we are

here concerned, will stand near to *Unciola*, Say. It is, however, more closely allied to *Chevreuxius*, Bonnier, being at the same time sharply distinguished from that genus by the character of the second uropods, which are here biramous, not as in M. Bonnier's genus uniramous.

Gen. GRANDIDIERELLA, Coutière.

1904. *Grandidierella*, Coutière, *Bulletin de la Soc. philomathique*, ser. 9, vol. vi, p. 173.

1906. *Grandidierella*, Stebbing, *Das Tierreich*, "Amphipoda," p. 739.

The genus is defined by M. Coutière as follows:—

Body little compressed; side-plates narrow. First antennæ with the first and second joints of the peduncle elongate, the third joint short. Accessory flagellum one-jointed, very small. Second antennæ at most equal to the preceding, fourth and fifth joints of the peduncle elongate. Mandibular palp with second joint slightly longer than first, and third than second; mandibular process narrow; cutting edge dentate. Lower lip with processes of the external lobes long and conical. First maxillæ with inner plate almost obsolete, without trace of setæ; outer plate with eleven spines. Second maxillæ having the inner plate furnished with two fringes of setæ. Maxillipeds having a series of spines on the outer plate, the finger short, unguiculate. First and second gnathopods subchelate, dissimilar; the first more robust than the second, with marked sexual dimorphism affecting both size and shape. Third, fourth and fifth peræopods with second joint expanded. The fifth peræopod almost twice as long as the third. Third uropods one-branched; peduncle a little widened on the inner side, shorter than the ramus. Telson emarginate, broader than long.

The species now to be added to the genus falls excellently under the original definition. The sister species, as often happens, are much less sharply separated in the female than in the male sex; but in both sexes they show a very clear distinction.

Accessory flagellum of first antennæ nearly as long as first joint of primary : wrist in first gnathopod of male more than twice as long as broad *G. mahafalensis*, Coutière.

Accessory flagellum of first antennæ not nearly as long as first joint of primary : wrist in first gnathopod of male not nearly twice as long as broad. *G. bonnieri*, sp. nov.

*Grandidierella bonnieri*, sp. nov.

(Plate vi.)

In preserved specimens the body is moderately compressed, except when the marsupium of the female is much distended with eggs. The lateral lobes of the head are rounded, carrying

the dark rounded eyes, the space between these being occupied by a large patch of dark colouring. The outlines of an undissected specimen are exceedingly difficult to make out in consequence of the numerous irregular patches of colour over the whole surface. None of the side-plates of the peræon are deep; those of the first two segments are somewhat squared with rounded corners, those of the two following are shallowly trilobed; and this appears to be the case with the sixth pair. The postero-lateral corners of the third pleon segment are rounded with a minutely produced point. The next three segments are each shorter than the third, decreasing in succession.

The first antennæ have the first joint rather stout, armed below with a spaced row of spines, two single and three in a group; the second joint is as long as the first, but much narrower; the third is less than a third part as long as the second; the flagellum is longer than the peduncle, with fifteen unequal joints in a male and eighteen in a female specimen. The accessory flagellum is microscopically small, but carrying one or two setules. This appendage is described as very small in the type species, but it is relatively so much smaller in the present that it affords a good specific character.

The second antennæ are stouter, but in both sexes shorter than the first. The first three joints are short, the next two long, subequal, longer than the first two joints of the first antennæ. The flagellum is rather shorter than the last joint of the peduncle, seemingly five-jointed in the male and four-jointed in the female, with several slightly curved spines, and perhaps a microscopical joint not included in the above enumeration. In M. Coutière's species the flagellum of the first antennæ in the male has 19—20 joints and is shorter than the peduncle, and is 16-jointed in the female; in the second antennæ of the male the flagellum is a little over half the length of the last peduncular joint, but is itself 9-jointed, a minute apical joint being included.

The upper lip in the present species has its margin evenly convex, not slightly emarginate as figured and described for *G. mahajalensis*.

The mandibles agree very nearly with M. Coutière's figures and description, except that the spine-row has only six spines on the left and five on the right mandible in the Indian species, instead of the dozen which are attributed to each mandible in the species from Madagascar. As usual, the accessory plate is more slender and less strongly dentate on the right than on the left mandible. In the generic definition M. Coutière speaks of the mandibular process as narrow, but it is not clear what part of the appendage is intended by this expression. Schiödte originally applied the expression not to the mandible itself, but to the conical prolongations of the outer lobes of the lower lip, to which M. Coutière refers in describing that organ.

The first maxillæ appear to have the inner plate here rather more distinct than in the type species, but without setæ. The

maxillipeds differ scarcely at all from those of the type species, except in having fewer spines round the apical and inner margin of the outer plates.

The most striking difference between the two species is afforded by the great first gnathopods of the male, the fifth joint or wrist in the earlier species being two and a half times longer than broad and having a narrow obtuse process on the palmar border, which is wanting to the much shorter wrist of the Indian form. Here the massive fifth joint is less than once and a half as long as broad. The hand is not long enough to reach beyond the wrist's palmar tooth, as it does in the other species, but it is distally broad enough to supply something more of a palm than that species displays. Its finger well overlaps the palmar tooth of the wrist, but to a considerably less extent than in the Madagascar form.

In the female the first gnathopod is not complexly subchelate as in the male, but simply subchelate. The hand is shorter than the wrist, with the palm rounded, a little oblique, finely denticulate, defined by a palmar spine, which is overlapped by the point of the finger. In both sexes the inner margin of the finger has some small denticles.

The second gnathopod of the male has the narrow, distally truncate, hand only a little shorter and narrower than the wrist, instead of being considerably smaller in both dimensions as in *G. mahafalensis*. The hind border of the wrist is strongly fringed with long spines. The apex of the finger reaches a little beyond the small palm. In the female the apex of the finger only reaches the end of the palm, otherwise their limbs are nearly alike in the two sexes. The branchial vesicle is narrow, with a constriction near the base, giving it a two-jointed appearance. The marsupial plate of the female is very extensive, and is fringed with setæ nearly all round.

The first and second peræopods are alike, apparently differing from the Madagascar species in the stouter form of the fifth joint, which is little longer than broad. The glandular contents of these limbs indicate that the animal is a tube-builder, and the upward or backward position of the finger in the third peræopods seems adapted for movement in such a dwelling. The third peræopods are very much shorter than either of the following pairs, of which the fifth pair is the longer. The hind margin of the second joint in this pair is fringed with long setæ, but by no means so densely as represented in the type species.

The pleopods have two coupling hooks, each with three pairs of reverted teeth, on the inner margin of the peduncle, the opposite margin being fringed with plumose setæ. The first joint of the inner ramus carries three cleft spines. This ramus is decidedly longer than the outer one, although each appears to have about the same number of joints,—twelve to thirteen.

The first uropods are the longest, the peduncle longer than the subequal rami, all strongly spined. In the second pair the peduncle is about equal to the rami; in the third it is much shorter than the

single ramus, which carries several slender spines. In one of the male specimens this ramus has a curious inward curved termination, which appears to be abnormal, but was found alike on each side of the telson. The telson is short, broad and thick; the under distal margin rounded, the upper excavate, with a projecting point at each corner, within which are some little prominent spines.

Length of the male about 4 mm., that of the female 5 mm.

*Locality.*—

Brackish pools, Port Canning, Lower Bengal, from which the specimens were obtained by Dr. Nelson Annandale.

The specific name is given out of respect to M. Jules Bonnier, whose services to carcinology are in high repute.

## EXPLANATION OF PLATE VI.

### GRANDIDIERELLA BONNIERI, sp. nov.

*n.s.* ♂ ♀.—Lines indicating natural size, without antennæ, of the male and female specimens respectively, figured below in lateral view.

*a.s.* ♂, *a.i.* ♂.—First and second antennæ of the male.

*gn.* 1, 2, ♂; *prp.* 1, 3, ♂.—First and second gnathopods, first and third peræopods of the male.

*urp.* 3, ♂; *T.*—Third uropod (abnormal) and telson in dorsal view of a male.

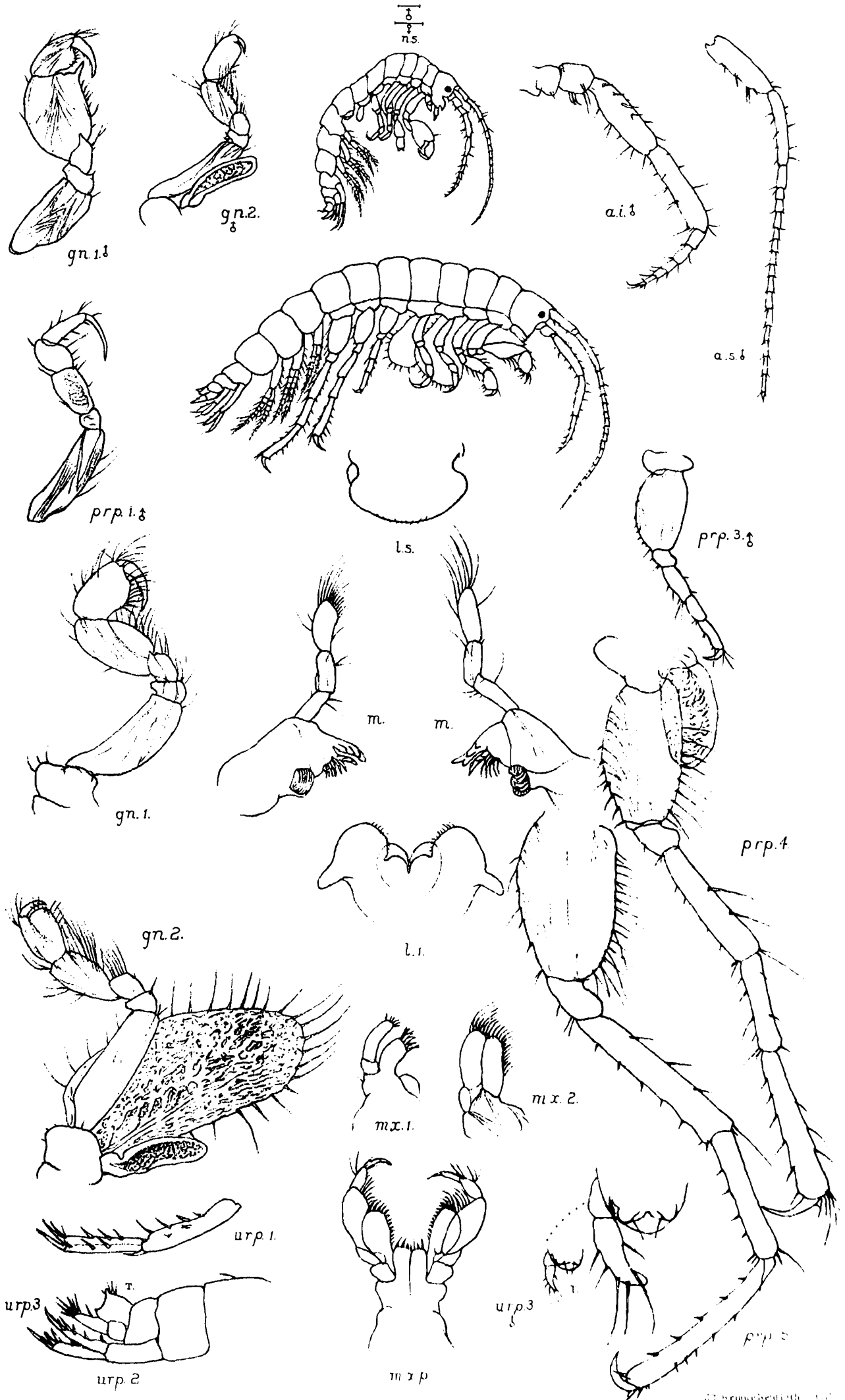
The remaining figures are from the female.

*l.s.*, *l.i.*—Upper and lower lips.

*m.*, *m.*; *mx.* 1, 2; *mxp.*—The two mandibles, first and second maxilla, maxillipeds. The mouth organs are magnified on a higher scale than the other appendages, except the telson and abnormal uropod of a male, of which the larger figure is magnified beyond all the rest.

*gn.* 1, 2; *prp.* 4, 5.—First and second gnathopods, fourth and fifth peræopods.

*urp.* 1, 2, 3; *T.*—First uropod, second and third uropods, with the telson in lateral view.



Del. T.R.R. Stebbing

GRANDIDIERELLA BONNIERI, n.sp.

23 Brancacciostrada - 1917

XIV.—DESCRIPTION OF A NEW SPECIES  
OF *DANIO* FROM LOWER  
BURMA.

By B. L. CHAUDHURI, B.A., B.Sc. (Edin.).

*Danio annandalei*, sp. nov.

Br. iii. D I. 15; A II. 16; P. 13; V I. 8; C 28; L. Lat. 46 to 50;  
L. Trans. 13/3.

Height of body in the total length 3; length of head in the total length 6; interorbital width in length of head 2; diameter of eye in the length of head 4.

The lower jaw is the longer and forms a part of the profile; the cleft of the mouth is directed obliquely upwards and outwards.

*Barbels*.—Two small pairs. The anterior (rostral) pair is once-and-a-half as long as the posterior (maxillary) pair, which is contained five times in the length of the head.

*Fins*.—Dorsal commences six rays in advance of the anal, and there are sixteen rows of scales before its commencement. Pectorals do not reach the ventrals and there is an appendant superior and inner to each pectoral fin not longer than the interorbital width. The ventral fin is smaller and shorter than the pectoral and has no appendant. The anal fin is situated three rows of scales below the lateral line. Fins are diffusely spotted with black spots. The caudal fin is deeply forked. The lateral line is concave and runs from behind the origin of the pectoral fin to the root of the caudal fin. The position of the vent is immediately anterior to the anal fin.

*Colour and markings*.—There are numerous dark spots on the opercles and suborbital region, but none on the scaleless part of the head. The scales are spotted and prettily fringed with dark spots. The back, which is highly curved, is steel-blue, below which the upper one-third is faintly yellow, followed by the middle third, which is variegated in bands and dashes to be described hereafter; then the lower third is faintly yellow (like the upper third), and is terminated by the highly curved silvery belly. As the markings of the middle third are conspicuously different from those found in other allied species, they are described below rather minutely—

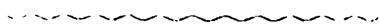
- (a) *Transverse markings*.—One transverse steel-blue bar in the pale yellow ground just behind the opercle, broad above and tapering below, followed by a transverse yellow band rather narrow, then a lighter steel-blue transverse band edged with light yellow.

(b) *Longitudinal markings*.—From above downwards—(1st) one faint steel-blue-gray band, short and thin, only one-fourth of the total length, occupying about the middle portion ; followed by (2nd) a thin yellow band which loses itself behind in a yellow background ; (3rd) a long steel-blue band, broad but rather faint, running as far back as the posterior end of the dorsal fin ; (4th) three broad yellow dashes (broken up) in a steel-blue ground, continuous in a line, with a yellow band behind commencing about the middle and running to the root of the caudal fin, where it loses itself in the yellow ground colour ; (5th) a broad steel-blue band getting broader behind and ending at the third row of scales before the commencement of the caudal fin ; (6th) four or five blurred dashes or round yellow markings losing themselves behind in the steel-blue ground of the band above (5th), which is broader posteriorly ; (7th) three or four bright yellow dashes in a steel-blue ground continuous with a yellow band that commences above the origin of the anal fin and continues towards the caudal fin, but loses itself in the yellow background ; (8th) a steel-blue band tapering posteriorly, gradually disappearing before the yellow band (7th) above ; (9th) a few faint yellow dashes, terminating as it were in the steel-blue background.

Besides other apparent and conspicuous differences the new species differs from *D. spinosus* in possessing appendants to the pectoral fins (whereas *D. spinosus* has none), and from *D. dangila*, which possesses appendants to the ventral fins.

Two specimens were obtained by Dr. Annandale in March, 1908, in a small jungle stream near Kawkareik, at the base of the Dawna Hills in the interior of the Amherst district of Tenasserim. Together with them were taken several specimens of *Danio dangila* and *D. albolineatus*.

The name of the genus is derived from the word "Dhani" (belonging to *dhan* = paddy), by which name all the allied species are collectively called by the Bengalese, probably referring to the smallness of their size or to their being found in grassy jungles in the edges of rivers and lakes. In this habitat these coloured stripes, loops and dashes are of great importance to these small fishes.



## XV — RHYNCHOTA MALAYANA

### PART I.

By W. L. DISTANT.

It is proposed in these papers, to give from time to time, contributions to a knowledge of the Rhynchota found to the east of the limits of the area dealt with in the volumes descriptive of the Fauna of British India. A number of species are common to the two areas, and to understand the components of the one, it is necessary to have a knowledge of the other. In fact North Australia cannot be eliminated though it is not proposed to deal with it in these papers. One of the rarest and most distinctive species in the Indian Pentatomidæ is *Amblycara gladiatoria*, Stål. It had only been recorded from "India" and Ceylon, and was of the utmost rarity in collections. Quite recently the British Museum received a specimen collected by Mr. Dodd in Queensland. It is also proposed to occasionally illustrate some of the many Malayan species described by Walker, the descriptions of which are frequently inadequate and provocative of synonymy by writers who cannot consult the types.

### Sub-order HETEROPTERA.

#### Fam. TINGIDIDÆ.

#### Genus ELASMOGNATHUS.

*Elasmognathus*, Fieb., Ent. Monogr., pp. 30 and 90 (1844).  
Type *E. helferi*, Fieb.

*Elasmognathus hewetti*, sp. nov. (Pl. vii, figs. 2, 2a.)

Head black with the antenniferous tubercles sometimes ochraceous; pronotum black, the anterior vesicle and lateral areas ochraceous; elytra piceous-brown, the sutural area darker brown, costal area ochraceous, inwardly margined, centrally spotted, and transversely marked with black, apical margin ochraceous, intersected by the apices of the brown veins; abdomen above shining black; body beneath black; legs ochraceous; antennæ brown, the apical joint black; pronotum with the anterior vesicle very coarsely punctate, its disk more thickly and finely punctate with a strong central longitudinal ridge, the lateral areas and the produced margins coarsely granulose, the pronotal posterior elongation more coarsely punctate than on disk, the produced

margins conically globose and upwardly directed; elytra with the discoidal area finely granulose.

Long incl. tegm.  $5\frac{1}{2}$  mm.

Hab.—Borneo; Kuching (Hewitt).

### Fam. LYGÆIDÆ.

#### Sub-fam. Heterogastrinæ.

##### Genus SADOLETUS.

*Sadoletus*, Dist., Faun. B. I. Rhynch., ii, p. 37 (1902).

Type *S. validus*, Dist.

##### *Sadoletus corvus*, sp. nov.

Head, pronotum and scutellum black; basal margin of pronotum and a central longitudinal line on its posterior lobe ochraceous; corium pale ochraceous, its apical area broadly black; membrane hyaline; body beneath black; legs castaneous-brown, bases of the femora and tarsi pale flavescent; head punctate, antennæ piceous, fourth joint longest, second longer than third; pronotum with the anterior lobe moderately globose, impunctate, posterior lobe coarsely punctate; scutellum finely punctate with a central carinate line which does not quite reach the base; corium coarsely punctate, the punctures arranged in longitudinal series; body beneath finely and obscurely greyishly pilose.

Long  $4\frac{1}{2}$  mm.

Hab.—Borneo; Santubong.

##### Genus DINOMACHUS.

*Dinomachus*, Dist., Ann. Mag. Nat. Hist. (7), viii, p. 473 (1901).

Type *D. marshalli*, Dist.

##### *Dinomachus fusus*, sp. nov. (Pl. vii, figs. 6, 6a.)

Head above fuscous brown, blackish at base, with a central ochraceous longitudinal line which is more distinct between the eyes; pronotum ochraceous, the anterior lobe, excluding lateral areas, black, with a short central ochraceous longitudinal line, posterior lobe with two central longitudinal fasciæ and a transverse spot near each basal angle black; scutellum and corium ochraceous, the latter with the apical area black, its extreme apex ochraceous; membrane hyaline; body beneath black, coxæ and sternal spots ochraceous; legs black, basal halves of femora and annulations to tibiæ pale flavescent; antennæ brownish-ochraceous, first joint short, second longest, a little longer than third, fourth short but longer than first; eyes moderately exserted; pronotum somewhat coarsely punctate, transversely compressed at about one-third from apex, anterior lobe

moderately globose, the posterior margin impunctate; scutellum somewhat thickly punctate, foveately impressed at each basal angle, the disk broadly transversely depressed before apical area; corium coarsely punctate; body beneath obscurely greyish pilose, the lateral margins of the abdomen palely spotted.

Long 6 mm.

Hab.—Borneo; Santubong.

## Sub-order HOMOPTERA.

### Fam. FULGORIDÆ.

#### Sub-fam. Issinæ.

#### Genus HILDA.

*Isthmia*, Walk., List Hom., iii, p. 732 (1851), *nom. præocc.*

*Hilda*, Kirk., Entomologist, 1900, p. 243, *nom. nov.*

Type *H. undata*, Walk.

*Hilda malayensis*, sp. nov. (Pl. vii, figs. 7, 7a.)

Head, pronotum and scutellum pale green; extreme apical margin of vertex almost continuously black; pronotum with the margins narrowly black or piceous, extreme basal margin with an almost continuous series of small greyish dots, basal area of face between the eyes black with four prominent central white spots, the black area also posteriorly narrowly margined with greyish-white, remainder of face and body beneath pale ochraceous; legs darker ochraceous, the anterior and intermediate tibiæ and tarsi piceous; tegmina pale testaceous, an oblique spot on basal area, a central transverse fascia narrowly margined on each side with piceous and widened at costal area into a somewhat large triangular patch greyish-white, the apical area greyish, suffused with pale ochraceous and containing near its inner margin a longitudinal series of small black spots with white centres, some of the spots being duplex; wings slightly fuliginous with fuscous veins; face strongly transversely indented between the insertions of the antennæ; basal margin of vertex finely callose; abdomen above fuscous brown with the segmental margins testaceous.

Long incl. tegm. 5 to 5½ mm.

Hab.—Siam; Malay States; Bukit Besar (Annandale and Robinson; Brit. Mus.).

### Fam. CERCOPIDÆ.

#### Genus EUCLOVIA.

*Euclovia*, Matsum., Journ. Sapporo Agr. Coll., ii, p. 24 (1903).

Type *E. okadæ*, Matsum.

*Euclovia convexa*, sp. nov. (Pl. vii, figs. 10, 10a.)

Vertex brownish ochraceous; pronotum ochraceous, a large transverse spot near anterior margin, and the posterior margin brownish; scutellum pale ochraceous; body beneath and legs brownish ochraceous; head beneath pale ochraceous, anterior margin to eyes, and the face centrally longitudinally black; an oblique spot near outer margin of cheeks, and a transverse spot on the acetabula black; tegmina ochraceous, basal area (mottled with ochraceous), a broad irregular discontinuous central fascia which is connected with the apex by a longitudinal streak, an apical costal streak and most of the veins piceous; vertex transversely impressed before apex; ocelli somewhat close together a little before basal margin; clypeus long and slender, extending between the anterior coxæ; face centrally longitudinally ridged; posterior tibiæ with two spines.

Long incl. tegm.  $7\frac{1}{2}$  mm.

Hab.—Borneo; Kuching (Hewitt).

Genus DINDA, gen. nov.

Vertex shorter than pronotum, sub-conically produced in front of eyes, the lateral and apical margins acute and reflexed, about as long as breadth between eyes, a discal conical carination on anterior half commencing on both sides at about middle of disk and united at apex; ocelli a little before base and in front of eyes, about as near to each other as to eyes; face flattened, slightly widened posteriorly, coarsely punctate, with an obscure central carination which does not reach base; clypeus long and broad, very strongly centrally longitudinally ridged; eyes long, oblique; pronotum much longer than vertex, lateral margins obliquely straight, anterior margin moderately convexly rounded, margins from basal angles to scutellum obliquely directed inwardly, posterior margin subangularly sinuate; scutellum subtriangular, its apex acute; rostrum reaching the intermediate coxæ; legs moderately short, posterior tibiæ with two spines; tegmina coriaceous, passing apex of abdomen, the apex rounded.

Type *D. maura*, Walk.

*Dinda maura*. (Pl. vii, figs. 1, 1a.)

*Aphrophora maura*, Walk., List Hom. Suppl., p. 187 (1858).

Vertex thickly punctate, the discal conical carination prominent; pronotum thickly punctate and slightly transversely wrinkled; scutellum with the lateral margins ridged; tegmina very thickly and finely punctate, their lateral margins narrowly obscurely castaneous; legs pale flavescent, tarsal claws piceous; rostrum pale flavescent.

Hab.—Singapore (Brit. Mus.). Borneo; Sarawak (Wallace; Brit. Mus., Sarawak Mus. and Coll. Dist.).

## Genus LORA, gen. nov.

Vertex conically produced in front of eyes, longer than space between eyes, strongly centrally longitudinally ridged, a transverse discal line near middle of disk from the ends of which an oblique line proceeds on each side to lateral margin, lateral and apical margins strongly ridged and reflexed; ocelli between eyes very much nearer to each other than to eyes which are long and oblique; face longitudinally broadly sulcate for half its length from base, the margins of the sulcate area strongly ridged; pronotum considerably longer than vertex, its anterior margin a little rounded, the lateral margins outwardly oblique to posterior angles, thence inwardly oblique to scutellum, posterior margin angularly sinuate; scutellum subtriangular; legs moderately short, posterior tibiæ with one spine; tegmina coriaceous, much longer than abdomen, the apices rounded.

Type *L. inclyta*, Walk.

*Lora inclyta*. (Pl. vii, figs. 3, 3a.)

*Aphrophora inclyta*, Walk., List Hom. Suppl., p. 187 (1858).

Pronotum and scutellum thickly finely punctate, obscurely wrinkled and very shortly ochraceously pilose; tegmina thickly finely punctate and sparingly transversely wrinkled; face strongly transversely striate on each side of the central sulcation; tarsi piceous.

Hab.—Borneo; Sarawak (Wallace; Brit. Mus.). S.-E. Borneo (Doherty; Coll. Dist.).

## Genus DAHA.

*Daha*, Dist., Faun. B. I. Rhynch., iv, p. 107 (1907).

Type *D. arietaria*, Dist.

*Daha kuchingensis*, sp. nov.

Body above and beneath and legs black; tegmina with a small triangular white costal spot on apical area; vertex finely tricarinate, the central carination very obsolete before reaching base, finely and obscurely punctate; eyes black margined with greyish; pronotum and scutellum very finely transversely rugulose; tegmina minutely thickly punctate.

Long  $6\frac{1}{2}$  to 7 mm.

Hab.—Borneo; Kuching (Hewitt).

## Genus EOSCARTA.

*Eoscarta*, Bredd., Soc. Ent., xvii, p. 58 (1902).

*Euryaulax*, Kirk., Rep. Exp. Stat. Haw. Plant. Assoc., pt. ix, p. 380 (1906).

Type *E. borealis*, Dist., = *E. eos*, Bredd.

*Eoscarta subdolens*.

*Cercopis subdolens*, Walk., Journ. Linn. Soc. Zool., i, p. 165 (1857).

*Triecphora subpustulata*, Walk., List. Hom. Suppl., p. 343 (1858).  
Hab.—Sarawak (Wallace; Brit. Mus.). Kuching (Sarawak Mus.).

*Eoscarta borealis*.

*Cosmoscarta borealis*, Dist., Tr. Ent. Soc. Lond., 1878, p. 321.

*Eoscarta borealis*, Dist., Faun. B. I. Rhynch., iv, p. 116 (1907).

*Eoscarta eos*, Bredd., Soc. Ent., xvii, p. 58 (1902).

Hab.—Assam; Tenasserim; Malay Peninsula; Perak (Doherty).

Siam; Malay States; Bukit Besar (Annand. and Robins.).

This species varies in the colour of the tibiæ; in some specimens they are wholly black, in others black only at apices.

*Eoscarta rufa*.

*Triecphora rufa*, Walk., Journ. Linn. Soc. Zool., x, p. 289 (1869).

Hab.—New Guinea (Wallace; Brit. Mus.).

*Eoscarta ferruginea*.

*Triecphora ferruginea*, Walk., List Hom., iii, p. 672 (1851).

*Cercopis ferruginea*, Stål, Öfv. Vet.-Ak. Förh., 1870, p. 721.

Hab.—Philippine Islds.

*Eoscarta antica*.

*Triecphora antica*, Walk., Journ. Linn. Soc. Zool., x, p. 289 (1869).

Hab.—Mysol (Wallace; Brit. Mus.).

#### Genus CONSIDIA.

*Considia*, Stål, Öfv. Vet.-Ak. Förh., 1865, p. 152.

*Tettigoscarta*, Bredd., Soc. Ent., xvii, p. 59 (1902).

*Sialoscarta*, Jacobi, Mitt. Zool. Mus. Berl., iii, p. 23 (1905).

Type *C. transversa*, Walk.

*Considia transversa*.

*Cercopis transversa*, Walk., List Hom. Suppl., iv, p. 1151 (1852).

*Considia oblonga*, Stål, Öfv. Vet.-Ak. Förh., 1865, p. 152.

Hab.—Java.

*Considia nitidula*.

*Tettigoscarta nitidula*, Bredd., Soc. Ent., xvii, p. 59 (1902).

Hab.—Malaccâ. Siam; Malay States; Bukit Besar (Annand. and Robins.; Brit. Mus.). Siam (Brit. Mus.).

*Considia cavata*.

*Triecphora cavata*, Walk., List Hom. Suppl., p. 343 (1858).

*Sialoscarta concinna*, Jacobi, Mitt. Zool. Mus. Berl., iii, p. 23; taf. i, fig. 10 (1905).

Hab.—Java.

#### Genus AUFIDUS.

*Aufidus*, Stål, Trans. Ent. Soc. Lond. (3), i, p. 594 (1863).

*Aufidellus*, Kirk., Rep. Exp. Stat. Haw. Plant. Assoc., pt. ix, p. 381 (1906).

*Aufiterna*, Kirk., loc. cit., p. 382.

*Aufidellus*, Kirk., cannot be separated from *Aufidus*. The type of Stål's genus (*A. trifasciatus*) is in the British Museum, as is also a specimen of the species described by Kirkaldy as *A. australensis*. The differential and only characters given by the last-named writer, "pronotum posteriorly is almost evenly rounded and the costal margin is not arched basally," constitute (when the species is examined) only very moderate specific differentiation. In his description of another proposed genus, *Aufiterna*,<sup>1</sup> he writes "posterior margin emarginate, while it is truncate in *Aufidus*." This is inaccurate; in the type of *Aufidus* (*A. trifasciatus*), the posterior pronotal margin is distinctly emarginate; neither did Stål make that structural character a generic distinction; he simply wrote "Thorax sexangularis." On the other hand *Aufiterna*, Kirk., is apparently only to be separated from *Aufidus* by the venation of the tegmina, "3 discoidals (subapical), 4 apicals well marked, while there are another 5 small cells marked off on the costal cell." It will be seen by the figure here given, that all these characters are more or less represented, and that the divisions of the costal cell are inconstant even in the same species and even in the same specimen.

*Aufidus spectabilis*, sp. nov. (Pl. vii, figs. 5, 5a.)

Head, pronotum, and scutellum ochraceous; a transverse spot at apex of vertex, a broad fascia between eyes, and a broad basal fascia to pronotum black; body beneath and legs ochraceous, basal half of face black, anterior tibiæ longitudinally streaked with black, tarsi more or less piceous; abdomen above testaceous; tegmina with the basal third ochraceous and opaque, this area outwardly margined by a transverse black fascia and containing a black streak on upper claval margin with the lower basal margin of the clavus also black, remaining area of tegmina hyaline with apical ochraceous suffusions, veins alternately ochraceous or piceous, costal area ochraceous; wings hyaline, palely ochraceous on basal area, the veins pale fuscous; vertex with a fine central longitudinal carination, and with a transverse impression near middle; pronotum with a central longitudinal sulcation not reaching the anterior margin, the posterior margin slightly emarginate; face globose, laterally compressed, centrally longitudinally sulcate on disk, costal cell with three or four small cells marked off by transverse veins.

Long excl. tegm.  $6\frac{1}{2}$  mm. Exp. tegm. 18 to 20 mm.

Hab.—Malay Archipelago; Halmaheira (Doherty; Brit. Mus.).

*Aufidus papuanus*, sp. nov.

Vertex and pronotum ochraceous; vertex with the apical margin narrowly and the basal margin broadly black; pronotum

<sup>1</sup> Kirkaldy says this genus is more allied to *Polychætophyes*, of which the typical species is referred to "pl. xxxiii, figs. 12 and 13," but no such illustration can be traced.

with about the basal half black; scutellum testaceous; body beneath and legs ochraceous, basal margin of face, a spot between face and eyes, a longitudinal streak to anterior tibiæ, anterior tarsi, tarsal claws, apex of rostrum, and lateral margins and apical area of abdomen beneath, piceous or black; tegmina with basal fourth ochraceous and opaque, this area broadly outwardly transversely margined with black, and containing a broad piceous claval streak, central area hyaline, the veins and the whole of the apical fourth fuscous brown, costal margin ochraceous; vertex without a central carination, face centrally sulcate for about half its length from base; pronotum centrally longitudinally sulcate on disk, its posterior margin almost straight; scutellum discally foveate; tegmina (in type) with six small cells in the costal cell of one tegmen and only three distinct cells in that of the other tegmen.

Long incl. tegm. 10 mm.

Hab.—New Guinea; Humboldt Bay (Doherty; Brit. Mus.).

*Aufidus erebus*, sp. nov.

Vertex pale luteous, a broad transverse fascia extending from base to anterior margins of eyes, and the apical margin black; pronotum pale luteous with a broad central brownish transverse fascia; scutellum pale luteous, the anterior margin and basal angles black; head beneath black, apices of face and cheeks, and the basal margin between face and eyes ochraceous; sternum and legs ochraceous, anterior tibiæ and all the tarsal claws piceous; abdomen beneath black; tegmina hyaline, the veins robust and black, basal fourth black, apical fourth piceous, costal margin ochraceous; vertex smooth not carinate; face broadly longitudinally sulcate for nearly its entire length; pronotum finely centrally discally sulcate; scutellum discally foveate; tegmina with the costal cell divided into three small cells on one tegmen, and into four on the other.

Long incl. tegm. 9 mm.

Hab.—New Guinea; Humboldt Bay (Doherty; Brit. Mus.).

Genus COLSA.

*Colsa*, Walk., Journ. Linn. Soc. Zool., i, p. 96 (1856).

Type *C. costæstriga*, Walk.

*Colsa matanga*, sp. nov. (Pl. vii, figs. 8, 8a.)

Vertex black, the front ochraceous; pronotum black, the anterior area broadly ochraceous; scutellum ochraceous, the basal angles black; abdomen above black, the basal area, the lateral margins and the anal appendage ochraceous; head beneath, legs and sternum ochraceous; central area and transverse striations to face, apices of anterior tibiæ, apices of tarsi, sternal spots and disk of abdomen beneath black; lateral margins of abdomen pale ochraceous, with the segmental incisures black; tegmina pale

hyaline, the veins fuscous brown, costal area piceous interrupted by an oblique transverse white spot beyond middle, and at apex almost narrowly continued across disk; posterior margin of claws piceous, an ochraceous spot at base; wings hyaline, the veins mostly darker, a little infuscate on posterior and apical margins, transverse veins in postcostal cell varying from five to six; vertex transversely impressed at union with front; face sulcate for its whole length, the sulcation narrower at base; pronotum centrally longitudinally impressed on basal area; scutellum broadly centrally foveate.

Long incl. tegm. 12 to 13 mm.

Hab.—Borneo; Matang.

#### Genus NOTOSCARTA.

*Notoscarta*, Bredd., Soc. Ent., xvii, p. 59 (1902).

Type *N. croceonigra*, Bredd.

*Notoscarta alboater*.

*Aufidus alboater*, Walk., Journ. Linn. Soc. Zool., x, p. 292 (1869).

*Notoscarta ptyeloides*, Bredd., Soc. Ent., xvii, p. 59 (1902).

Hab.—New Guinea; Mysol.

#### *Notoscarta zebrina*, sp. nov.

Vertex and pronotum black; vertex with a pale marginal spot in front of each eye, eyes and scutellum greyish white; body beneath black; apex of face, clypeus, rostrum, coxæ, legs and the abdominal segmental margins, greyish white; tegmina black; a costal marginal spot extending to about one-third from base and curved inward at its apex, almost apical half of the costal area divided by three transverse piceous lines, and a spot at apex of clavus (posteriorly divided) greyish white; face subglobose, faintly transversely striate on each side; rostrum reaching the intermediate coxæ; pronotum thickly finely transversely striate.

Long incl. tegm. 5½ mm.

Hab.—Mysol (Wallace; Brit. Mus.).

#### Genus MIOSCARTA.

*Mioscarta*, Bredd., Allg. Zeitschr. Ent., vi, p. 123 (1901).

Type *M. forcipata*, Bredd.

*Mioscarta bipars*.

*Aufidus bipars*, Walk., Journ. Linn. Soc. Zool., x, p. 290 (1869).

*Aufidus partitus*, Walk., loc. cit.

Hab.—Celebes.

#### Fam. JASSIDÆ.

#### Sub-fam. Bythoscopinæ.

#### Genus IDIOCERUS.

*Idiocerus*, Lewis, Trans., Ent. Soc. Lond., I, p. 47 (1836).

Type *I. adustus*, Herrich-Sch.

*Idiocerus nitidulus*.

*Iassus nitidulus*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 322 (1869).

Hab.—Mysol.

Allied to *I niveosparsus*, Leth.

*Idiocerus laticeps*.

*Iassus laticeps*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 323 (1869).

Hab.—Celebes.

This species is closely allied to the preceding and principally differs by the markings of the face, and may probably be but a variety of *I nitidulus*. In his description Walker has omitted to mention the presence of a somewhat large triangular black spot near each basal angle of the scutellum.

#### Genus BYTHOSCOPIUS.

*Bythoscopus*, Germ., in Silberm. Rev. Ent., i, p. 180 (1833); Dist., Faun. B. I. Rhynch., iv, p. 190 (1907).

Type *B. lanio*, Linn.

*Bythoscopus punctatus*.

*Idiocerus* ? *punctatus*, Kirby, in Mon. Christ. Isld., p. 138 (1900)

Hab.—Christmas Isld.

*Bythoscopus unicolor*.

*Bythoscopus unicolor*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 320 (1869).

Hab.—Celebes.

#### Genus BALOCHA.

*Balocha*, Dist., Faun. B. I. Rhynch., iv, p. 189 (1907).

Type *B. tricolor*, Dist.

*Balocha angulifer*.

*Iassus* ? *angulifer*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 325 (1869).

Hab.—Mysol.

#### Genus CHUNRA.

*Chunra*, Dist., Faun. B. I. Rhynch., iv, p. 193 (1907).

Type *C. puncticosta*, Walk.

*Chunra gigantea*, sp. nov. (Pl. vii, figs. 11, 11a.)

Vertex, pronotum and scutellum very pale ochraceous; vertex with a pale central longitudinal fascia on each side of which is a darker fascia, a fuscous spot before eyes and two central fuscous transverse spots near base; eyes castaneous; pronotum with four large fuscous brown spots crossing disk, the two central ones longitudinal and posteriorly united, the lateral spots subtriangular; scutellum with four large spots on basal half, the two central ones almost fused, and the apex fuscous-brown, a piceous spot on

each lateral margin; abdomen above testaceous; head beneath sternum and legs pale ochraceous, abdomen beneath testaceous; margins of face, two anterior comma-like oblique spots, an oblique line before each eye, and a posterior broad central longitudinal spot fuscous brown; apices of tibiæ and the tarsi more or less infuscate; tegmina smoky hyaline, the veins fuscous brown, costal area fuscous brown mottled with pale ochraceous, apical margin and a subapical marginal fascia fuscous brown; wings smoky hyaline, the veins fuscous brown, outer margins a little infuscate; ocelli prominent, as near to each other as to eyes; scutellum long and broad, longer than pronotum and vertex together.

Long excl. tegm., ♀, 9 mm. Exp. tegm. 19 to 20 mm.

Hab.—Borneo; Kuching (Shelford); S.-E. Province (Doherty).

### Sub-fam. Tettigoniellinæ.

*Tettigoniellina*, Dist., Faun. B. I. Rhynch., iv, p. 200 (1907) (incl. synonymy).

*Tetigoniidæ*, Kirk., Rep. Exp. Stat. Haw. Plant. Assoc., pt. ix, p. 316 (1906).

The name *Tettigoniellidæ* was first applied to this sub-family by Dr. Melichar. In the reference above given will be found a full synonymy of other terms used.

### Genus TETTIGONIELLA.

*Tetigonia*, Geoffr., Hist. abreg. des Ins., 1, p. 429 (1798-99), *nom. præocc.*

*Tettigoniella*, Jacobi, Zool. Jahr. Syst., xix, p. 778 (1904), *nom. nov.*

*Tettigoniella eburnea*.

*Tetigonia eburnea*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 168 (1856).

Walker's short description is quite inadequate and misleading; the following description is taken from the type and two other specimens, all collected by Wallace at Sarawak.

Head, pronotum and scutellum stramineous; vertex with two small spots at apex and a larger discal spot, black; head beneath, sternum and legs very pale stramineous; abdomen beneath golden yellow; tegmina and wings milky white.

Although Walker's description *supra* is simply "whitish, vertex of head conical. Wings milk-white," he subsequently (Journ. Linn. Soc. Lond. Zool., x, p. 304, 1869) refers to it in a different way, and implies that there are "black marks on the head."

Hab.—Borneo.

*Tettigoniella erichsoni*, sp. nov. (Pl. viii, figs. 2, 2a.)

Vertex dark indigo-blue, much paler on each side near eyes pronotum pale ochraceous, the anterior and lateral margins broadly

bluish grey; scutellum pale ochraceous, its apex dark indigo-blue; abdomen above and body beneath dark indigo-blue; apex of anal segment, cheeks, lateral areas of prosternum, coxæ and legs stramineous; apices of femora, tibiæ and tarsi more or less indigo-blue, bases of posterior tarsi stramineous; tegmina with less than basal half very pale stramineous, sometimes with a few brownish spots near base, remaining area fuscous brown with discal bluish suffusions; wings fuliginous brown, the veins darker; vertex broad, rounded anteriorly, foveately impressed near each eye; face somewhat discally depressed, transversely striate on each lateral area.

Long excl. tegm., ♂, and ♀, 10 to 11 mm. Exp. tegm. 23 mm.  
Hab.—Sumatra (Erichson; Brit. Mus.; Forbes; Coll. Dist.).

*Tettigoniella ramana*, sp. nov. (Pl. viii, figs. 15, 15a.)

Vertex indigo-blue, much paler and brighter blue on basal area; pronotum bronzy yellow, the anterior and lateral areas suffused with pale blue; scutellum bronzy yellow more or less suffused with pale blue; abdomen above shining purplish blue, faintly tomentose; body beneath and legs testaceous suffused with bluish, abdomen beneath more testaceous, the anal segment, sublateral segmental spots and anal appendage, more or less bluish; tegmina bronzy yellow, basal fourth pale violaceous containing two dark spots, some inconstant violaceous suffusions on disk (sometimes practically absent), beyond clavus and encroaching on apical area, subhyaline; wings dark fuliginous; vertex broad, anteriorly rounded, centrally discally impressed; face broadly longitudinally smooth and pale bluish, the lateral areas brownish and strongly transversely striate.

Long excl. tegm., ♀, 12 mm. Exp. tegm. 26 to 27 mm.  
Hab.—Sumatra (Erichson; Brit. Mus.).

*Var.* Abdomen above testaceous. (Probably a rubbed or spirit specimen.)

Allied to *T. ferruginea*, Fabr.

*Tettigoniella cumatilis*, sp. nov. (Pl. viii, figs. 5, 5a.)

Body, legs and tegmina pale bluish with fuscous brown shadings; wings pale fuscous brown with blue suffusions on basal area; vertex with two large black spots commencing near ocelli and united on anterior margin; pronotum blackish on basal area; face centrally broadly and longitudinally smooth and bluish, the lateral areas more or less black and coarsely transversely striate, the cheeks thickly whitely tomentose; abdomen beneath whitely tomentose; legs darker, somewhat blackish; tegmina (when not rubbed) regularly bluish except at apical margins which are somewhat broadly fuscous brown; vertex foveately impressed at the region of each ocellus; abdomen above with a central longitudinal ridge, vertex broadly anteriorly rounded.

Long excl. tegm., ♂, 8 mm. Exp. tegm. 17 to 18 mm.

Hab.—Malay Peninsula; S. Perak (Ridley; Brit. Mus.).  
Borneo; Sarawak (Shelford; Brit. Mus.).

*Tettigoniella tamborensis*, sp. nov. (Pl. viii, figs. 1, 1a.)

Vertex orange-red, the disk nearly wholly occupied by a large black spot which, commencing at base, is angulated on each side in front of eyes and is narrowed and bifid near anterior margin; pronotum orange-red, its anterior and posterior margins irregularly black; scutellum wholly black; head beneath orange-red, face and clypeus with a central longitudinal black fascia; sternum, abdomen beneath and legs very pale ochraceous; spots on each side of prosternum, posterior abdominal marginal segments (interrupted on disk), apex of anal segment, and lateral abdominal spots, black; tegmina reddish-ochraceous, costal, claval and inner margins somewhat broadly black, apical area brownish, inwardly black; vertex moderately long, somewhat conically rounded in front, a little depressed between ocelli; pronotum sparsely obscurely punctate; scutellum transversely impressed before apical area.

Long incl. tegm., ♀, 12 mm.

Hab.—Malay Archipelago; Tambora, Sambawa (Doherty; Brit. Mus.).

*Tettigoniella timorensis*, sp. nov. (Pl. viii, figs. 3, 3a.)

Head, pronotum, body beneath and legs ochraceous; vertex with three black spots, two transverse on anterior margin and one larger and irregularly shaped at base; pronotum with a small linear transverse spot at middle of anterior margin, and the posterior margin broadly black; scutellum with a black discal spot; face with two black basal spots (which are a continuation of the two on the anterior margin of vertex; tibiæ brownish ochraceous, tarsal claws black; tegmina ochraceous, with three longitudinal black fasciæ, one costal which becomes subcostal before apical area, one before inner claval margin, and the other on posterior claval margin extending for about two-thirds its length from base; vertex broad and rounded in front, a little foveately impressed at inner margins of eyes; pronotum smooth and shining, discally arcuately impressed before anterior margin; scutellum strongly transversely impressed before apical area.

Long incl. tegm., ♀, 9½ to 10 mm.

Hab.—Malay Archipelago; Timor Dili, Wetter near Timor (Doherty; Brit. Mus.).

*Tettigoniella wetterensis*, sp. nov. (Pl. viii, figs. 4, 4a.)

Head, pronotum and body beneath ochraceous; legs stramineous; vertex with three black spots, two on anterior margin and one at base; pronotum with a large transverse anteriorly

inwardly angulated basal spot, a small transverse spot on anterior margin, and a slender central discal longitudinal line, black, near anterior margin, a discal transversely angulated pale ochraceous impression; scutellum with a large black spot which occupies the whole of the surface excluding the lateral and apical areas; face with two elongate black basal spots (which are a continuation of the two on the anterior margin of vertex); tarsal claws piceous; tegmina olivaceous brown, the costal area more ochraceous, the costal margin and the apex, black. Allied to *T timorensis*, Dist., but differing by the different colour and markings of the tegmina, different maculation to the pronotum and scutellum, and the pale unicolorous legs with the tarsal claws only darker.

Long incl. tegm., ♀, 11 mm.

Hab.—Malay Archipelago; Wetter near Timor (Doherty).

*Tettigoniella mitrata*, sp. nov. (Pl. viii, figs. 6, 6a.)

Vertex pale purplish, the apical margin broadly black, the posterior lateral margins near the eyes, ochraceous; pronotum ochraceous, excluding anterior area thickly blackly punctate, the basal margin black; scutellum ochraceous; body beneath and legs ochraceous, a short central black line at base of face; sternum more or less whitishly tomentose, abdomen beneath with large brownish spots; tegmina black, costal margins and claval sutural margins very narrowly ochraceous, apices inwardly obscurely subhyaline; vertex broad, rounded in front, a little apically upturned, thus giving the disk a foveate appearance; ocelli placed far apart, rather near the eyes; face long, centrally flattened, the lateral areas transversely striate; scutellum very strongly transversely impressed before apical area.

Long incl. tegm. 9 mm.

Hab.—New Guinea; Humboldt Bay (Doherty; Brit. Mus.).

*Tettigoniella annandalei*, sp. nov. (Pl. viii, figs. 7, 7a.)

Very pale virescent; vertex, anterior area of pronotum, scutellum, body beneath and legs more ochraceous; vertex with a large outwardly branching black spot, commencing near the neighbourhood of the ocelli and then continued on each side to apex; pronotum pale shining greyish, the anterior area pale ochraceous, a somewhat large and angulated black spot on disk; scutellum with a large black spot in each basal angle; face with two short anterior discal black stripes continued from those on vertex, and the posterior halves of the lateral margins broadly black; tegmina pale virescent, the apical areas subhyaline, two transverse black spots on clavus, one near middle the other near apex, two transverse black spots on corium, the first extending from claval to costal margins, the second shorter and discal, the hyaline apical area inwardly margined with black, and a small piceous spot near middle of claval suture; vertex broad, anteriorly rounded;

face posteriorly longitudinally wrinkled; pronotum convex, depressed anteriorly; scutellum depressed to, and transversely impressed before apical area.

Long incl. tegm. 12 mm.

Hab.—Malay Peninsula; S. Perak, Talum (Annandale and Robinson; Brit. Mus.).

Allied to the Bornean *T. scitipennis*, Walk.

*Tettigoniella perakensis.*

Head, pronotum, scutellum, body beneath and legs ochraceous; vertex spotted with black, a spot at apex, another at middle of posterior disk, and two on posterior margin which are almost connected with a curved line in front of each of them; pronotum with a black spot near middle of each lateral margin; scutellum with three black basal spots, and a subapical black one; tegmina pale bluish-grey sparingly sprinkled with ochraceous, costal and claval sutural margins very narrowly ochraceous, apical area subhyaline, a black spot crossing apex of clavus and another subcostal black spot near apex; vertex broad and rounded in front; pronotum thickly brownly punctate; face broad, globose, the marginal areas transversely striate.

Long incl. tegm. 12 mm.

Hab.—Malay Peninsula; Perak (Doherty; Coll. Dist.).

*Tettigoniella baluensis*, sp. nov.

Head, pronotum, and scutellum very pale luteous; vertex with a large central black spot; pronotum with a broad anterior transverse fascia and two semicircular basal spots, black; scutellum with two lunulate spots on anterior margin and a discal spot prolonged towards apex, black; face with a triangular spot at base and the apex black; body beneath black; legs pale luteous, base and apex of anterior femora, the whole of the intermediate and posterior femora, and apices of the tibiæ and tarsi black; margins of the abdominal segments beneath narrowly pale luteous; tegmina orange-red, their apices, excluding posterior border, black; head broad, rounded in front, excavate on each side before eyes; face broadly longitudinally flattened in the middle the lateral areas transversely striate; pronotum sparingly obscurely punctate.

Long incl. tegm. 12 mm.

Hab.—Borneo; Kina Balu (Brit. Mus.).

*Tettigoniella horsfieldi*, sp. nov. (Pl. viii, figs. 17, 17a.)

Vertex ochraceous or pale testaceous, the whole disk excluding margins occupied by a large black spot; pronotum and scutellum pale testaceous; abdomen above pale testaceous, its disk longitudinally purplish red; face brownish ochraceous, two small black spots at the middle of the basal margin and a black longitudinal

central fascia extending for about half the length from base; margins of eyes black; abdomen beneath pale testaceous, the lateral margins ochraceous; legs ochraceous, the anterior legs darker; tegmina pale ochraceous, the clavus, base, two broad transverse fasciæ, the first near middle, the other near end of clavus, pale testaceous, the outermost fascia united posteriorly with a bright purplish fascia, the two including a greyish spot; apical area more or less fuscous; wings fuliginous, the veins piceous; vertex long, as long as breadth between eyes, moderately globose, with a central ill-defined longitudinal ridge, excavate on each side near eyes; face globose, the central area flattened, the lateral areas ridged; pronotum with a central arcuate ridge before the anterior margin.

Long excl. tegm., ♀, 9 mm. Exp. tegm. 21 mm.

Hab.—Java (Horsfield Coll. ; Brit. Mus.).

*T. trita*, Walk., is allied to this species.

*Tettigoniella mouhoti*, sp. nov.

Testaceous; two spots on apical margin of vertex and a central elongated spot at its base, three rounded spots to pronotum—one before middle of anterior margin, the other two wide apart on basal margin; four spots to scutellum—three on basal margin, one discal and rounded before apical area, a spot at base of tegmina, a transverse fascia to face before clypeus; large spots to sternum, coxæ, apices of femora and tibiæ, the tarsi, and abdomen beneath black; abdominal margins beneath, the two apical segments excluding central spots, and the anal segment ochraceous or testaceous; apical area of tegmina inwardly extended to apex of clavus obscure subhyaline; wings black; vertex long, obliquely rounded anteriorly, about as long as breadth between eyes, centrally basally somewhat flattened, the lateral margins moderately broadly deflexed; face very broadly centrally flattened, the lateral areas transversely striate; pronotum transversely arcuately depressed a little in front of middle; scutellum transversely impressed before apical area.

Long incl. tegm., ♀, 18 mm.

Hab.—Siam (Mouhot; Brit. Mus.).

*T. elongata*, Walk. from Borneo is an allied species.

*Tettigoniella whiteheadi*, sp. nov. (Pl. viii, figs. 9, 9a.)

Head, pronotum, scutellum, body beneath and legs stramineous or very pale ochraceous; vertex with two small central spots on apical margin, a cordate spot at middle of basal margin, and a spot on each lateral margin between eyes and apex, black; margins of central area to face, black; pronotum with a central longitudinal black fascia which is attenuated on the anterior area; scutellum with a central longitudinal black fascia which does not quite reach apex; apices of tarsi piceous; tegmina milky-white, most of the veins piceous, claval sutural margin black; vertex

somewhat convex, rather obliquely rounded in front, transversely impressed in front of eyes; pronotum nearly twice as long as vertex, transversely striate, with a discal angulate impression a little before anterior margin; scutellum lunately impressed before apical area; face centrally broadly flattened, the lateral areas finely transversely striate; tegmina practically smooth, very indistinctly finely wrinkled.

Long incl. tegm. 11 mm.

Hab.—Philippines (Whitehead; Brit. Mus.).

Allied to *T. nigrilinea*, Stål.

*Tettigoniella wallacei*, sp. nov. (Pl. viii, figs. 10, 10a.)

Head, pronotum, scutellum, sternum and legs pale ochraceous; abdomen beneath orange-yellow; ocelli black; tegmina subhyaline, the veins yellowish; claval sutural margin black, which is piceously continued about half-way to apex; vertex broadly transverse rounded in front; pronotum arcuately impressed before anterior margin; face centrally discally longitudinally flattened, the lateral areas strongly transversely striate.

Long incl. tegm. 6 mm.

Hab.—Malay Archipelago; Mysol (Wallace; Brit. Mus.).

#### Genus BHANDARA.

*Bhandara*, Dist., Faun. Brit. Ind. Rhynch., iv, p. 221 (1907).

Type *B. semiclara*, Sign.

*Bhandara sarawakensis*, sp. nov.

Vertex, pronotum, scutellum and tegmina black; body beneath and legs pale ochraceous; base, sometimes basal two-thirds of face, and the lateral striations to same, a large spot on each side of mesosternum, apices of tibiae, the tarsi and margins of anal segment, black or piceous; lateral margins of vertex and inner margins of eyes ochraceous (in some specimens this character is barely discernible); vertex broad, transverse, rounded in front, broadly foveately excavate at middle of basal area, also foveately impressed on each side near inner margins of eyes; pronotum very indistinctly transversely wrinkled, with a short transverse discal arcuate impression near anterior margin; scutellum transversely impressed before apical area which is slightly gibbous, the extreme apex linearly acute; tegmina only finely wrinkled, the apical half of costal area and the apical margin brownish; face centrally broadly flattened, its lateral areas strongly transversely striate.

Long incl. tegm., ♀, 14 mm.

Hab.—Borneo; Sarawak (Shelford; Brit. Mus.).

*Bhandara picturata*, sp. nov. (Pl. viii, figs. 18, 18a.)

Vertex black, a somewhat large flavescent spot on each lateral margin and the inner margins of eyes of the same colour; pronotum

black with a large inwardly subangulate flavescent spot on each lateral area; scutellum black; the lateral areas of mesonotum flavescent; abdomen reddish ochraceous, a transverse basal spot and the greater part of the disk longitudinally black, a series of black spots on connexivum; body beneath and legs pale ochraceous, a black spot on each side of mesosternum, and a large basal triangular black spot to face; tegmina reddish-ochraceous, a large pale spot on clavus broadly black at each end, and the veins within it also black; a discal black spot beyond middle, and a large black spot crossing tegmen near apex and which is broadly widened on the inner margin; wings dark fuliginous, paler on costal area; vertex with three prominent foveations on basal area, the central foveation largest and ovate and situate between the ocelli; face finely transversely carinate on each lateral area.

Long excl. tegm., ♀, 11 mm. Exp. tegm. 25 mm.

Hab.—Malay Peninsula; Perak (Doherty).

#### Genus KOLLA.

*Kolla*, Dist., Faun. Brit. Ind. Rhynch., iv, p. 223 (1907).

Type *K. insignis*, Dist.

*Kolla polita* (Tab. fig. 14a).

*Tettigonia polita*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 168 (1857).

Hab.—Borneo.

#### Genus SPHINCTOGONIA.

*Sphinctogonia*, Bredd., Abh. Nat. Ges. Halle, xxiv, p. 128 (1901).

Type *S. guttivitta*, Walk.

*Sphinctogonia guttivitta*.

*Tettigonia guttivitta*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 301 (1869).

*Sphinctogonia quincuncula*, Bredd., Abh. Nat. Ges. Halle, xxiv, p. 128 (1901).

Hab.—Celebes.

*Sphinctogonia lineolata*. (Pl. viii, figs. 16, 16a.)

*Tettigonia lineolata*, Walk., Journ. Linn. Soc. Lond. Zool. i, p. 167 (1857).

Hab.—Borneo.

#### Sub-fam. Gyponinæ (?).

#### Genus DODA, gen. nov.

Vertex longer than broad between eyes, centrally strongly longitudinally carinate, strongly foveate at inner margins of eyes, ocelli placed submarginally just in front of eyes; antennæ long and slender, above half the length of body; face elongate, longer than broad, slightly gibbous, sinuate at inner margins of eyes; pronotum moderately convex, anteriorly deflected, centrally, longitudinally strongly ridged, base concavely sinuate on each side, lateral margins very slightly rounded, posterior angles shortly

spinous, anterior margin a little excavate for the reception of the head; scutellum broad, subtriangular, about as long as broad at base, transversely impressed before apical area which is centrally longitudinally carinate; tegmina long and narrow, much longer than abdomen, valvate beyond clavus, three long apical cells, one or more small subapical cells beyond clavus (inconstant in number); legs very robust, excluding posterior femora longly spinulose, posterior femora strongly broadened and spinulose at their apices, tibiæ moderately flattened and sulcate beneath.

Type *D. laudata*, Dist.

I have placed this genus provisionally in the *Gyponinæ*.

*Doda laudata*, sp. nov. (Pl. vii, figs. 9, 9a.)

Vertex, pronotum and scutellum black finely mottled with ochraceous, vertex more or less anteriorly ochraceous; pronotum with a greyish spot on the central carination; scutellum with a spot on each lateral margin and the apex greyish white, body beneath and legs black, basal area of face margined with ochraceous, and with two small greyish spots at base; anterior femora obscurely spotted with dull ochraceous beneath; tegmina black, largely spotted with white, the largest spots on costal and inner margins, some minute reddish-ochraceous spots on disk; wings pale fuliginous.

Long excl. tegm. 5 mm.; incl. tegm. 8½ mm.

Hab.—Siam, Malay States; Bukit Besar (Annandale and Robinson; Brit. Mus.), Borneo; Kuching (Hewitt).

### Sub-fam. Jassinæ.

#### Genus HECALUS.

*Hecalus*, Stål, Ann. Soc. Ent. Fr. (4), iv, p. 65 (1864).

Type *H. paykulli*, Stål.

*Hecalus parvus*:

*Ledra parva*, Walk., List Hom., iii, p. 828 (1851).

*Selenocephalus parva*, Stål, Öfv. Vet.-Ak. Förh., 1862, p. 494.

Hab.—Hongkong.

#### Genus DABRESCUS.

*Dabrescus*, Stål, Öfv. Vet.-Ak. Förh., 1870, p. 738.

Type *D. remotus*, Walk.

*Dabrescus ineffectus*.

*Bythoscopus ineffectus*, Walk., List Hom. Suppl., p. 266 (1858).

Hab.—North China.

*Dabrescus metallicus*. (Pl. viii, figs. 12, 12a.)

*Bythoscopus metallicus*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 173 (1857).

Hab.—Borneo.

† Including the *Acocephalinæ*.

*Dabrescus lætissima*.

*Bythoscopus lætissima*, Walk., Journ. Linn. Soc. Lond. Zool., i,  
p. 174 (1857).

Hab.—Borneo.

*Dabrescus nigrilinea*.

*Bythoscopus nigrilinea*, Walk., Journ. Linn. Soc. Lond. Zool., i,  
p. 174 (1857).

Hab.—Borneo.

*Dabrescus costalis*. (Pl. viii, figs. 8, 8a.)

Vertex ochraceous, the anterior margin narrowly black, and a transverse linear piceous spot before each eye; pronotum brownish ochraceous with thickly placed fine paler rugosities; scutellum dull obscure pale brownish; abdomen above piceous brown, base and apex of apical segment ochraceous, anal segment black; face pale castaneous, basal margin darker, followed by a transverse ochraceous line extended between the upper margins of eyes, the inner margins of eyes also ochraceous; cheeks piceous, their margins ochraceous; sternum piceous, its lateral margin broadly sulphur-yellow; abdomen beneath and legs ochraceous; tegmina pale brownish ochraceous, venation a little darker, costal margin ochraceous beneath which the costal area is piceous brown, a large greyish white costal spot before apex, apical margin fuscous brown; wings pale fuliginous with the veins darker.

Long excl. tegm., ♀, 6 mm. Exp. tegm. 16 mm.

Hab.—Borneo; Kuching (Hewitt).

## Genus TARTESUS.

*Tartessus*, Stål, Öfv. Vet.-Ak. Förh., 1865, p. 156.

Type *T. ferrugineus*, Walk.

*Tartessus antecedens*.

*Bythoscopus antecedens*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 316 (1869).

*Bythoscopus bimarginatus*, Walk., *loc. cit.*, p. 318.

Hab.—Morty; New Guinea; Ceram.

This may prove to be but a synonym of *T. fieberi*, Stål, from Mysol.

*Tartessus polygrammus*. (Pl. viii, figs. 11, 11a.)

*Bythoscopus polygrammus*, Walk., Journ. Linn. Soc. Lond. Zool.,  
x, p. 317 (1869).

Hab.—N. Guinea; Morty.

*Tartessus bistriga*.

*Bythoscopus bistriga*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 317 (1869).

*Tartessus concolor*.

*Bythoscopus concolor*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 317 (1869).

Hab.—Mysol.

*Tartessus basivitta.*

*Bythoscopus basivitta*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 318 (1869).

*Bythoscopus luteatus*, Walk., loc. cit., p. 319.

Hab.—Waigiou ; Mysol ; Sula.

*Tartessus dimidiatus.*

*Bythoscopus dimidiatus*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 319 (1869).

Hab.—Dorey.

*Tartessus colligatus.*

*Bythoscopus colligatus*, Walk., Journ. Linn. Soc. Lond., Zool., x,  
p. 319 (1869).

Hab.—New Guinea.

*Tartessus flavibasis.*

*Bythoscopus flavibasis*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 320 (1869).

Hab.—Aru.

*Tartessus diaphanus.*

*Bythoscopus diaphanus*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 321 (1869).

Hab.—New Guinea.

*Tartessus cupreipennis.*

*Bythoscopus cupreipennis*, Walk., Journ. Linn. Soc. Lond. Zool.,  
x, p. 321 (1869).

Hab.—New Guinea.

*Tartessus scabrifrons.*

*Bythoscopus scabrifrons*, Walk., Journ. Linn. Soc. Lond. Zool.,  
x, 321 (1869).

Hab.—New Guinea.

*Tartessus badius.*

*Bythoscopus badius*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 321 (1869).

Hab.—New Guinea.

*Tartessus semivenosus.*

*Bythoscopus semivenosus*, Walk., Journ. Linn. Soc. Lond. Zool.,  
x, p. 322 (1869).

Hab.—Celebes.

## Genus BORDURIA, gen. nov.

General shape and form of *Tartessus* but differing by the face which is sub-elongately rounded, foveately depressed, and with its margins ridged ; tegmina veined as in *Tartessus*.

Type *B. impressa*, Walk.

*Borduria impressa*. (Pl. viii, figs. 13, 13a.)

*Bythoscopus impressus*, Walk., Journ. Linn. Soc. Lond. Zool.,  
x, p. 322 (1869).

Hab.—Batchian.

## Genus NORSIANA, nom. nov.

*Norsia*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 326 (1869),  
nom. *præocc.*

Type *N. flavidorsum*, Walk.

"Body slender. Head as broad as the thorax; vertex arched, nearly twice as broad as long; front flat, nearly horizontal, beneath the vertex. Seta of the antennæ rather shorter than the body. Scutum much arched" (Walker). Vertex with a distinct central impressed line, ocelli on anterior margin close to eyes; face narrowing to clypeus; pronotum with the lateral margins a little angulated, anteriorly convexly arched between the eyes, posteriorly truncate; scutellum flattened, transverse, a little deflected to the transverse impression before apical area; legs slender, posterior tibiæ longly spinose; tegmina with four apical and two narrow anteapical cells.

*Norsiana flavidorsum* (pl. vii, figs. 12, 12a).

*Norsia flavidorsum*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 326 (1869); *dilecta*, Walk., MS.

Hab.—Mysol (Wallace; Brit. Mus.); N. Guinea.

A specimen labelled *dilecta*, Walk., from New Guinea is in the British Museum, but I have been unable to trace its description.

The species described by Walker as *Norsia fulvescens* is not a Jassid at all.

## Genus JASSUS.

*Jassus*, Fabr., Syst. Rhyng., p. 85 (1803).

*Cælidia*, Germ., Mag. Ent., iv, p. 75 (1821).

Type *J. nervosus*, Fabr.

*Jassus glabra*.

*Tettigonia glabra*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 168  
(1857).

Hab.—Borneo.

*Jassus inclinans*.

*Tettigonia inclinans*, Walk., Journ. Linn. Soc. Lond. Zool., i,  
p. 169 (1857).

*Cælidia cupraria*, Walk., *loc. cit.*, p. 173.

*Cælidia marginifrons*, Walk., *loc. cit.*, x, p. 310 (1869).

Hab.—Borneo; Mysol.

*Jassus albisigna*.

*Cælidia albisigna*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 173  
(1857).

Hab.—Borneo.

*Jassus pardalis*.

*Cælidia pardalis*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 173  
(1857).

Hab.—Borneo.

*Jassus dirigenis.*

*Cælidia dirigenis*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 172 (1857).

*Tettigonia multipars*, Walk., List Hom. Suppl., p. 220 (1858).

Hab.—Borneo ; Hongkong.

*Jassus guttivena.*

*Cælidia guttivena*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 99 (1856).

Hab.—Malacca.

*Jassus punctivena.*

*Cælidia punctivena*, Walk., Journ. Linn. Soc. Lond. Zool., i, p. 99 (1856).

Hab.—Malacca.

*Jassus diversus.*

*Cælidia diversa*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 309 (1869).

Hab.—Mysol ; New Guinea ; Waigiou.

*Jassus piceus.*

*Cælidia picea*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 309 (1869).

Hab.—Mysol.

*Jassus subnotatus.*

*Cælidia subnotata*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 309 (1869).

Hab.—Mysol.

*Jassus verticalis.*

*Cælidia verticalis*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 310 (1869).

Hab.—New Guinea.

*Jassus canifascia.*

*Cælidia canifascia*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 311 (1869).

Hab.—Morty.

*Jassus inscriptus.*

*Cælidia inscripta*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 311 (1869).

Hab.—Aru ; New Guinea.

*Jassus luteifascia.*

*Cælidia luteifascia*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 311 (1869).

*Cælidia unifasciata*, Walk., *loc. cit.*, p. 313.

Hab.—Mysol.

*Jassus rufivena.*

*Cælidia rufivena*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 312 (1869).

Hab.—Gilola, Sula.

*Jassus albipes*.

*Cælidia albipes*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 312 (1869).

Hab.—New Guinea.

*Jassus subapicalis*.

*Cælidia subapicalis*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 312 (1869).

Hab.—Mysol.

*Jassus roseifascia*.

*Cælidia roseifascia*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 315 (1869).

*Cælidia selecta*, Walk., *loc. cit.*

*Cælidia guttulosus*, Walk., MS.

Hab.—Mysol; Sula.

*Jassus maculiceps*.

*Cælidia maculiceps*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 315 (1869).

Hab.—Batchian.

*Jassus testaceus*.

*Cælidia testacea*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 315 (1869).

Hab.—Mysol.

*Jassus guttatus*.

*Cælidia guttata*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 313 (1869).

*Cælidia sexguttata*, Walk., *loc. cit.*, p. 314.

Var. *Cælidia terminalis*, Walk., *loc. cit.*, p. 314.

Hab.—Mysol; New Guinea.

The var. *terminalis*, Walk., has the tegmina without white spots, but their apices whitish as in the typical forms.

*Jassus brevis*.

*Tettigonia brevis*, Walk., List Hom., iii, p. 774 (1851).

*Cælidia brevis*, Stål, Ofv. Vet.-Ak. Förh., 1862, p. 494.

Hab.—Hongkong.

*Jassus dubia*.

*Tettigonia? dubia*, Walk., List Hom., iii, p. 781 (1851)

*Cælidia dubia*, Stål, Ofv. Vet.-Ak. Förh., 1862, p. 494.

Hab.—Philippines.

*Jassus leucomelana*.

*Cælidia leucomelana*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 313 (1869).

Hab.—Mysol.

*Species in a more or less mutilated condition.**Jassus? dorsimacula*.

*Cælidia dorsimacula*, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 314 (1869).

Hab.—New Guinea.

*Jassus?* *aurulenta*.

*Cælidia aurulenta*, Walk., Journ. Linn. Soc. Lond. Zool., x,  
p. 316 (1869).

Hab.—Morty.

Genus SCAPHOIDEUS.

*Scaphoideus*, Uhler, Trans. Maryl. Ac. Sci., 1888, p. 33.

Type *S. immistus*, Say.

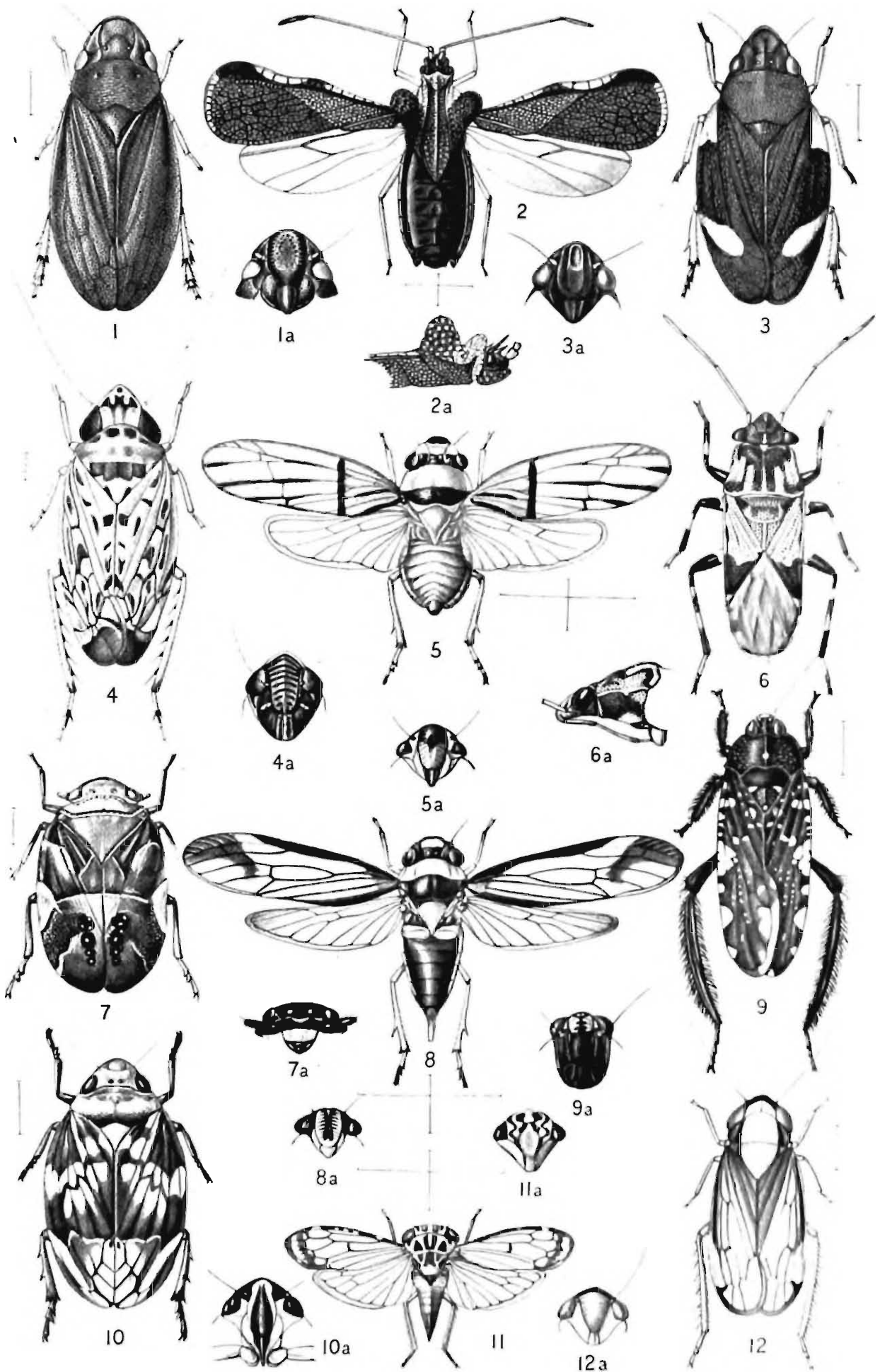
*Scaphoideus literatus*, sp. nov. (Pl. vii, fig. 4.)]

Vertex greyish white, crossed in front of eyes with a transverse undulated black fascia, posterior margin of this fascia and inner margin of eyes purplish red, a rounded black spot at apex; pronotum dull greyish, the anterior margin and two transverse discal spots ochraceous; scutellum ochraceously spotted on basal half, the apical half greyish white; face flavescent, with numerous transverse black lines, the basal margin narrowly white; body beneath and legs pale ochraceous, posterior tibiæ spotted with black; tegmina pale flavescent, the veins piceous, two white spots on claval suture, two white spots at base of clavus, two discal white spots, and a spot of the same colour near apex of costal margin, apex greyish margined with piceous; vertex strongly angulate anteriorly, longer than breadth between eyes.

Long incl. tegm.  $4\frac{1}{2}$  mm.

Hab.—Borneo; Kuching (Hewitt).



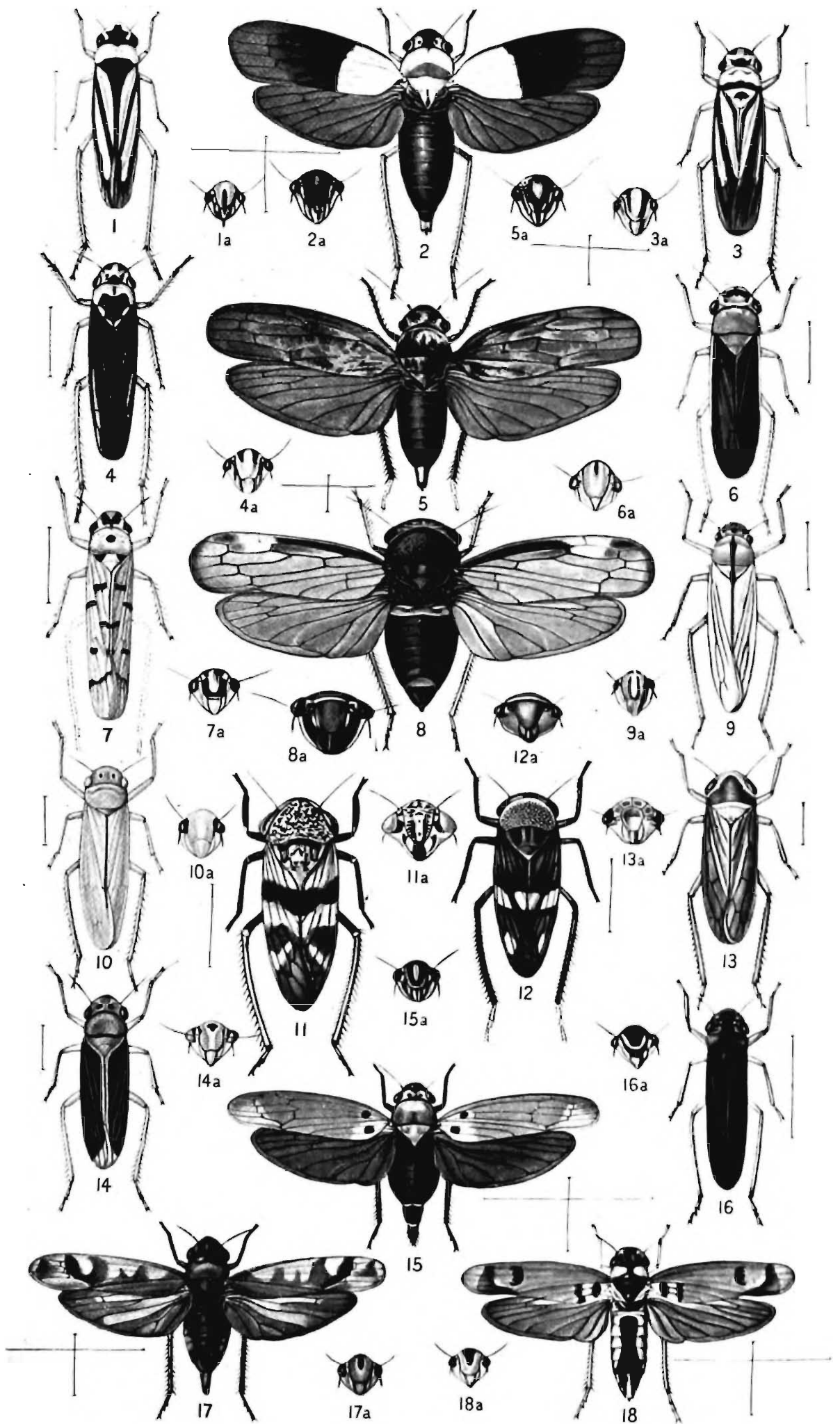


Horace Knight, del.

West, Newman, proc.

1. DINDA MAURA
2. ELASMOGNATHUS HEWETTI.
3. LORA INCLYTA.
4. SCAPHOIDEUS LITERATUS.
5. AFIDUS SPECTABILIS.
6. DINOMACHUS FUSUS.

7. HILDA MALAYENSIS
8. COLSA MATANGA
9. DODA LAUDATA.
10. EUCLOVIA CONVEXA.
11. CHUNRA GIGANTEA.
12. NORSIA FLAVIDORSUM.



Horace Knight, del.

West, Newman proc.

TETTIGONIELLA TAMBORENSIS.  
 .. ERICHSONI.  
 .. TIMORENSIS.

7. TETTIGONIELLA ANNANDALEI.  
 8. DABRESCUS COSTALIS.  
 9. TETTIGONIELLA WHITEHEADI.

13. BORDURIA IMPRESSA.  
 14. KOLLA POLITA.  
 15. TETTIGONIELLA RAMANA.

## XVI.—*CIMEX ROTUNDATUS*, SIGNORET

By CAPTAIN W. S. PATTON, I.M.S., *Membre Correspondant*,  
*Société de Pathologie Exotique* (Paris); *King Institute*  
*of Preventive Medicine*, Madras.

A reference to the extensive literature on the bed-bug would lead one to suppose there was nothing new to be learnt about this insect, but Mr. A. Arsène Girault,<sup>1</sup> who is at present compiling a complete bibliography of the bed-bug, some five hundred odd papers, states that the majority of the accounts are of little value and are merely re-ompilations; it is, however, surprising to find that erroneous statements regarding the habits of this pest still exist in modern text-books on parasitology. These errors are obviously due to the fact that the writers have compiled their information from old and faulty sources and have not themselves verified the statements of the earlier entomologists. I<sup>2</sup> recently pointed out that in addition to the misleading and loose statements regarding the habits of this insect, very little was known of the species associated with man. Medical men and others who have conducted experiments with the bed-bug often speak of it by a general name, *bug* in English, *Wanze* in German, and *punaise* in French; the conclusions drawn from such experiments must therefore lead to confusion, and very little value can be attached to them. The reason for this inaccuracy is not far to seek: *Cimex lectularius*, Linnæus, is the only well-known species; *Cimex ciliatus*, Eversmann, *Cimex rotundatus*, Signoret, and *Cimex macrocephalus*, Fieber, are so imperfectly known that the majority of investigators take it for granted that *Cimex lectularius* is the only bed-bug, the others being very doubtful species; for this reason the scientific name is often omitted.

Two years ago, when conducting my experiments on the bed-bug of Madras, I considered it was *Cimex lectularius*, Linnæus, as the only available literature<sup>3</sup> on the subject described this bug as occurring throughout British India and Ceylon; while *Cimex macrocephalus*, Fieber, was only known from Bhamo (Burma). As the description of *lectularius* did not, however, tally with that of the Madras bug, I obtained some living specimens of *lectularius*, Linnæus, from

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<sup>1</sup> A. Arsène Girault, *Psyche*, June-August 1905, December 1905, April-June 1906; *Journal of the American Medical Association*, July 14, 1908; "A Bibliography of the Bed-bug, *Cimex lectularius*, Linnæus," *Zoologische Annalen*, 1908.

<sup>2</sup> Patton, *Indian Medical Gazette*, February 1907.

<sup>3</sup> Distant, *Fauna of British India—Rhynchota*, vol. ii.

London, and at once found the local bug was not the same. About that time I sent some specimens to Mr. Distant, who kindly informed me they were *macrocephalus*, Fieber. In order, therefore, to find out whether *lectularius* did really occur in India, I obtained, through the civil and medical authorities, a very large collection of bugs from all parts of India, Burma, Assam, and the Malay Archipelago. As a result of the examination of these specimens it was found the Indian bed-bug was *macrocephalus*, and that *lectularius*, as far as I was able to ascertain, is limited to the North-West Frontier Province and the Kurram Valley. In the recent English edition of Braun's work, *macrocephalus* is not mentioned, but *rotundatus*, the bed-bug of the Island of Réunion, is described as a variety of *lectularius*. On reading Signoret's<sup>1</sup> description of *rotundatus*, I was struck with some important differences between it and *lectularius*; in fact Signoret gave an exact description of *macrocephalus*. Dr. Barbeau, Director of the Medical and Health Departments of the Island of Mauritius, to whom I applied for bed-bugs, kindly sent me a valuable collection from the Island, and through his French colleagues obtained many hundreds from Réunion. I was thus able to settle with certainty that the bed-bug of Mauritius and Réunion is identical with *macrocephalus* of Fieber; and as Signoret described it before Fieber, I have adopted the name *Cimex rotundatus* for the Indian bed-bug. Continuing my investigations of the two species *lectularius* and *rotundatus*, I have found that the former is distributed chiefly throughout the temperate zones while the latter is a tropical or subtropical species. I have recently had *rotundatus* sent to me from the West Indies where, as in the case of Mauritius, it was most probably introduced by Indian coolies; it also occurs in the Congo (specimens kindly sent me by Dr. C. Wellmann) and Sierra Leone.

As is well known, the family *Cimicidæ*, which contains four genera—*Cimex*, *Æciacus*, *Cocadumus*, and *Hematosiphon*—belongs to the *Heteroptera*, a sub-order of the *Rhynchota*, and comes between the two families *Phymatidæ* and *Ceratocombidæ*. The genus *Cimex* contains four species—*Cimex lectularius*, Linnæus; *Cimex rotundatus*, Signoret; *Cimex columbarius*, Jenyns; and *Cimex pipistrelli*, Jenyns. All the species have the following characters: They are flat, reddish-brown insects, with a short, broad head containing two large eyes but no ocelli. The thorax; or more correctly the prothorax, is semilunar in shape, with its anterior angles extended; the elytra or wing pads are rudimentary, and lie over the metathorax. The abdomen consists of seven segments and an eighth or anal appendage; the legs are slender, the anterior tibiæ more than three times as long as the tarsi, which are three-jointed. The proboscis is flexed in a groove beneath the head and prothorax.

*Cimex rotundatus*, Signoret (plate xiii, figs. 1 and 2), is of a dark mahogany colour, and differs from the type species *lectularius*,

<sup>1</sup> Signoret, V., "Notice sur quelq. Hémipt. nouv.," *Annales Soc. Entomol. France*, 1852, x, p. 539.

Linnæus (figs. 3 and 4), in the following respects: *its head is not as long or as broad as that of lectularius; its prothorax, which is also narrower and shorter, is rounded to the margin, and quite unlike that of the type species, whose prothorax is raised in the centre but flattened abruptly at a line a little beyond the level of the eyes. The abdomen of Cimex rotundatus is less orbicular and broadest at the second segment, whereas that of lectularius is broadest at the third segment.*

These are the chief points by which the two bugs can be distinguished, and a reference to the drawings accompanying this paper will at once help anyone to identify them. Mr. Maxwell-Lefroy,<sup>1</sup> in a recent paper, doubts the validity of the two species *lectularius* and *rotundatus*, and states their distribution is imperfectly known. I can only refer him to the typical specimens I have sent him and to my paper on the distribution of the two species. I have not yet seen *Cimex ciliatus*, Eversmann, which is said to occur in Russia (Kasan); Eversmann's<sup>2</sup> description suggests *Cimex columbarius*, Jenyns.

*Cimex rotundatus*, Signoret, is chiefly associated with man; but I have had a number of specimens taken in Madras from the yellow bat *Scotophilus kuhli*, which also harboured *Cimex pipistrelli*, Jenyns; the latter species, as far as I am aware, has not been recorded from India before. The Indian bed-bug, I find, will feed on any animal in the absence of man, and I once placed some on the small Pipistrelle, *P. abramus*, which always roosted in one particular part of a punkah in my study. The bugs, after gorging, left the bat and secreted themselves in the punkah, returning to the bat when it came back early in the morning. The host relations of this bug are therefore of some importance. *Cimex rotundatus* breeds throughout the year in India and abounds in all native houses and other places frequented by natives, such as Government offices, tram-cars, railway stations and carriages. The bugs are carried about in clothes, bedding, books and furniture. The habits and life-history are at present being investigated, as well as the best method of destroying the bugs; and the results, I hope, will be communicated later.

I shall always be glad to get specimens of bed-bugs from India and other parts of the world; the distribution of *lectularius* in North India requires to be worked out more carefully as well as that of *rotundatus* in Africa where Kala Azar exists. Bugs are best sent alive in a little tin box, the lid of which has been perforated; dead bugs must be put into spirit.

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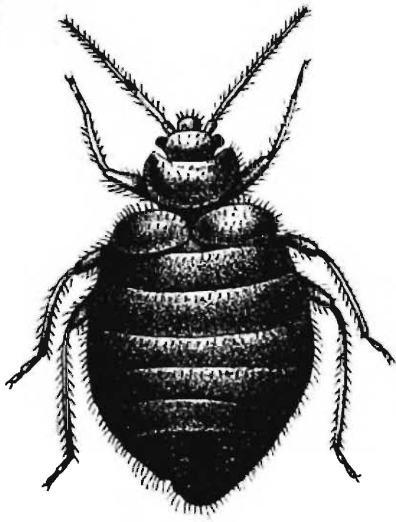
Maxwell-Lefroy, *A preliminary account of the biting flies of India*, 1907.

Eversmann, E., "Quædam insectorum species novæ," *Bullétin Soc. Impér. Nat.*, Moscow. 1841, xiv.

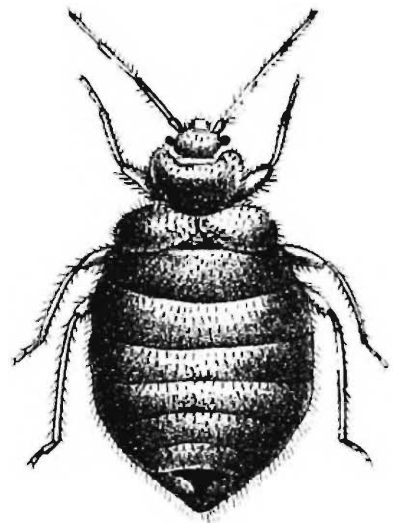
### EXPLANATION OF PLATE XIII.

- FIG. 1.—*Cimex rotundatus*, Sign., ♂, from Madras, × 8.  
,, 2.—*Cimex rotundatus*, Sign., ♀, from Burma, × 8.  
,, 3.—*Cimex lectularius*, Linn., ♂, from Kurrum, North  
India, × 8.  
,, 4.—*Cimex lectularius*, Linn., ♀, from London, × 8.  
,, 5.—Ventral surface of *Cimex rotundatus*, showing the flexed  
position of the proboscis, × 13.

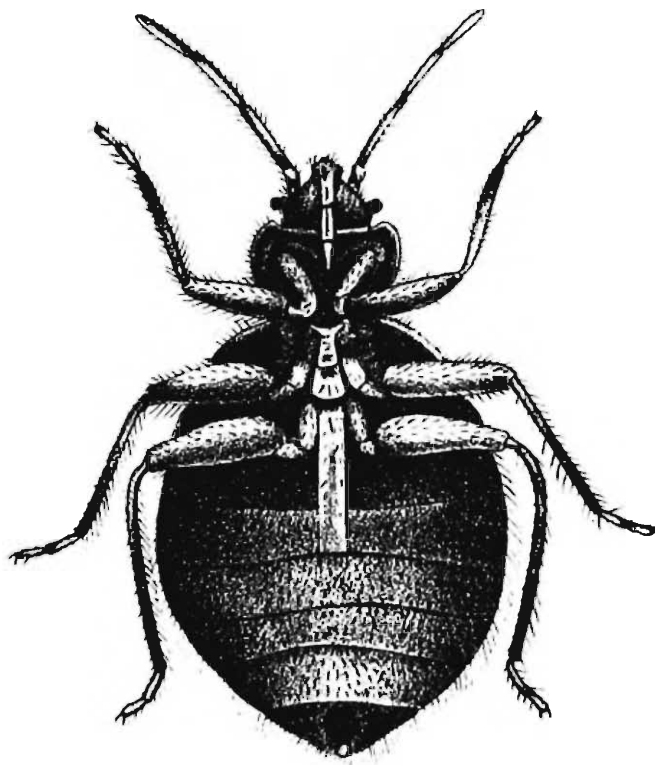
Figures 1 to 4 are drawn from accurate measurements of fresh specimens.



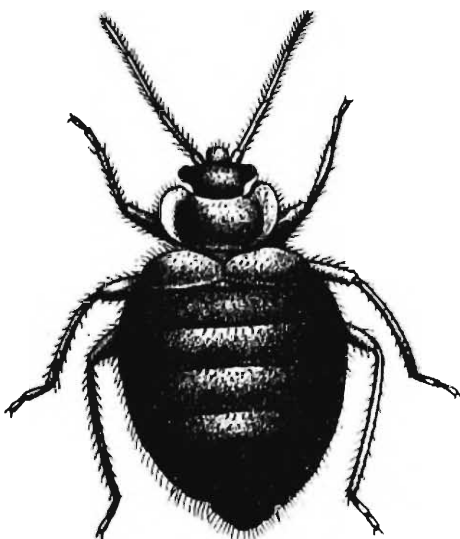
*Fig. 1.*



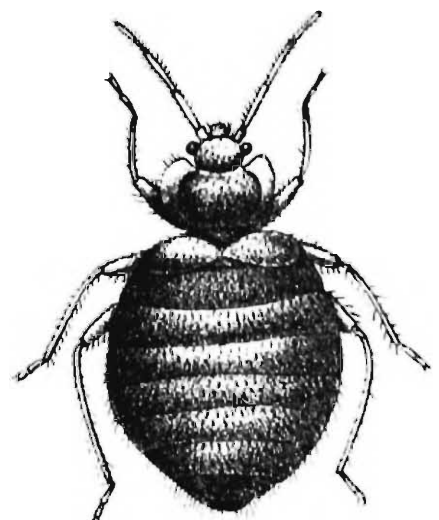
*Fig. 2.*



*Fig. 5.*



*Fig. 3.*



*Fig. 4.*

## XVII.—NOTES ON FRESHWATER SPONGES

By N. ANNANDALE, D.Sc., *Superintendent, Indian Museum.*

### IX.—PRELIMINARY NOTICE OF A COLLECTION FROM BURMA, WITH THE DESCRIPTION OF A NEW SPECIES OF *Tubella*.

The collection, of which this paper forms a preliminary account, was made by myself and a native collector in Rangoon and in the Amherst district of Tenasserim during the latter half of February and the first half of March of the present year. The following species were found:—

*Spongilla proliferens*, mihi, in ponds at Rangoon and in a lake at Kawkareik, Amherst district.

„ *carteri*, Bwk., in ponds at Rangoon and (gemmules) on the surface of the lake at Kawkareik.

*Ephydatia indica*, mihi, in the Moulmein waterworks and in a jungle pool near Kawkareik.

*Trochospongilla latouchiana*, mihi, in the lake at Kawkareik.

„ *phillottiana*, mihi, in a jungle pool near Kawkareik.

*Tubella vesparioides*, sp. nov., in the Kanghyi (“great pond”) at Mudon, near Moulmein, Amherst district.

The only other form known from Burma is Kirkpatrick's *Spongilla loricata* var. *burmanica*, which was described in the last number of these *Records* (vol. ii, p. 97). Thus, five out of the seven species now known from the province are also common in Lower Bengal, while only two, both widely distributed forms, have been found in Western India.

The new species of *Tubella*, of which a diagnosis follows, is closely related to *T vesparium* (Martens) from Borneo, differing from this species in its smooth, amphioxous skeleton spicule and in the deeply indented rotule of its gemmule spicule.

#### *Tubella vesparioides*, sp. nov.

Closely related to *T vesparium* (Marts.).

Sponge massive, without branches, hard but brittle, almost black in colour (dry); the surface covered with a network of stout spicule fibres, the interstices of which are more or less deeply sunk, with sharp fibres projecting vertically upwards at the nodes; the whole mass pervaded by a similar network, which is composed of a considerable number of spicules lying parallel to one another, overlapping at the ends and bound together by a profuse secretion of spongin. Skeleton spicules rather

stout, smooth, amphioxous, bent in a wide arc or, not infrequently, at an angle. No true flesh spicules. Gemmule spicules terminating above in a rounded, knoblike structure and below in a relatively broad, flat rotule, which is very deeply and irregularly indented round the edge when mature, the spicule having the form of a sharp pin with a round head at an earlier stage of development; shaft of adult spicules projecting slightly below the rotule, long, slender, generally armed with a few stout conical spines, which stand out at right angles to it. Gemmules numerous throughout the sponge, spherical, provided with a short, straight foraminal tubule, surrounded by one row of spicules, which are embedded in a rather thin granular coat.

Average length of skeleton spicule	0.316	mm.
„ breadth of skeleton spicule	0.0135	„
„ length of gemmule spicule	0.046	„
„ diameter of rotule	0.0162	„
„ diameter of gemmule	0.446	„



XVIII.—ON THE FRUIT BATS OF THE  
GENUS *PTEROPUS* INHABITING THE  
ANDAMAN AND NICOBAR ARCHIPE-  
LAGOS, WITH THE DESCRIPTION OF  
A NEW SPECIES.

By GEO. E. MASON.

Having recently had occasion to examine the species of *Pteropus* recorded from the Andaman and Nicobar Archipelagos, with the object of ascertaining what may be regarded as established facts respecting the differentiation and distribution of the recognised forms, and finding, as the result of my studies, that many of the doubtful references in relation to the synonymy of the several species are not only thereby corrected, but have likewise furnished much additional data in respect to their range of distribution, I have, upon careful consideration, deemed it expedient to place on record the conclusions at which I arrived, the liberal material at my command having offered exceptional opportunities for the carrying out of this object. One species hitherto confounded with the large Malayan Kalong I have been obliged to describe as new.

Five well-defined and characteristic species of *Pteropus* are now known to occur in the Nicobar and Andaman Archipelagos, three of them, we may conclude, being peculiar to the islands, and the remaining two only occurring as stragglers; one of these latter species, *viz.*, *Pteropus celæno* (= *edulis*), however, should possibly be regarded as a regular migrant during the monsoons.

*Pteropus melanotus*, Blyth.

1846. *Pteropus edulis*, Blyth, *Journ. Asiat. Soc. Bengal*, xv, p. 367.  
1861. *Pteropus nicobaricus*, Fitzinger, *Sitzungsber. Math. Natur-  
wissensch. Cl. Kais. Akad. Wissensch., Wien*, xlii (1860),  
p. 389, 1861 (*nomen nudum*).  
1863. *Pteropus melanotus*, Blyth, *Cat. Mammal. Mus. Asiat. Soc.  
Bengal*, p. 20 (*nomen nudum*).  
1869. *Pteropus nicobaricus*, Zelebor, *Reise der Oesterreichischen  
Fregatte Novara, Zool.*, i (Wirbelthiere), 1, Mamm., p. 11.

From a brief passage occurring in one of a series of letters written by the Rev. John Gottfried Haensel, a missionary of the

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<sup>1</sup> Letters on the Nicobar Islands, their Natural Productions, and the Manners, Customs, and Superstitions of the Natives, etc., etc. Addressed by the Rev. John Gottfried Haensel (the only surviving missionary), to the Rev. C. J. Latrobe, 1812.

Church of the United Brethren, descriptive of the ethnology and natural productions of the Nicobar Islands, observed during a residence of eight years in the group (1779-1787), and also from the widely scattered references to be met with in the journals of later observers, we have long known that the rank and luxuriant forests which clothe a greater part of the numerous islands comprising this archipelago, have afforded subsistence to at least one representative of the family of large frugivorous bats belonging to the genus *Pteropus*. Fitzinger, however, in 1861 (*Sitzungsb. Wien Akad.*, p. 389) was the first writer to recognise this bat as a distinct species by name, specimens having reached Vienna, together with other material collected in Car-Nicobar by the naturalists attached to the Austrian exploratory expedition of the frigate "Novara" in 1858. Although Fitzinger assigned the name of *Pteropus nicobaricus* to this bat, no details of the specific characters which constituted the species were given until Zelebor<sup>1</sup> published his exhaustive, though scarcely diagnostic, description in 1869.

It should, however, be remembered that prior to the publication of Fitzinger and Zelebor's name and description, specimens of the same Nicobarian bat had been deposited in the Museum of the Asiatic Society of Bengal so long ago as 1846 by Captain H. Lewis, the examples being contained in a collection made during a cruise of the schooner "L'Espiegle" in the previous year, amongst the islands of the Nicobar Archipelago; and this collection, supplemented by additional material bequeathed to the Museum of the Society by the Rev. J. Barbe, formed together the subject of a paper by Blyth in the *Journal of the Asiatic Society of Bengal* (vol. xv, 1846, p. 367), descriptive of the vertebrated fauna of the Nicobar Islands; and we may here conveniently give the following transcription taken from his original description of the bats contained in the collection:—

"*Pteropus edulis*, *Pt. javanicus*, Horsf., etc., etc.—Three specimens are alike remarkable for having the throat and front of the neck black, the head blackish, the nape dull reddish-brown, the back shining black, flanks and vent dull black, and the rest of the under-parts dull reddish-brown, much paler in the centre."

The detailed form of this notice would lead us to infer that Blyth was constrained to include these specimens under this title, although the differentiation of the examples in form and colour must have strongly impressed him at the time he compiled his article. When seventeen years later he published the *Catalogue of Mammalia in the Museum of the Asiatic Society of Bengal* (1863), these original specimens of Captain Lewis's received specific distinction under the name of *Pteropus melanotus*. Immediately following the publication of the Catalogue, Dr. Frederick J. Mouat's book of *Adventures and Researches among the Andaman Islands* was issued, with a zoological appendix contributed by Blyth; and in an

<sup>1</sup> *Reise der Oester. Freg. Novara*, Saugethiere, p. 11.

introductory note we learn that a "species" (of *Pteropus*) "is common in the Nicobars which is styled *Pteropus nicobaricus* by the naturalists of the 'Novara' expedition, and *Pt. melanotus* in the *Catalogue of the Mammalia in the Museum of the Asiatic Society.*" Proceeding, Mr. Blyth, in a succeeding passage, admits that he is unacquainted with the literature describing the discoveries of the Austrian expedition.

Through the courtesy of Dr. Annandale, the Superintendent of the Indian Museum, Calcutta, I have been enabled to examine one of Captain Lewis's specimens, which is also one of the originals of Blyth's first and early description of 1846, and likewise the type specimen of his *Pteropus melanotus* of 1863. The example agrees perfectly in all its essential characters with the *Pteropus nicobaricus* described by Zelebor in 1869. Under these circumstances it is evident, therefore, Zelebor's name can no longer be employed for this species, except as a synonym, having been for many years, as I have shown, superseded by the published description of Blyth in 1846. The species must, in consequence, now stand as *Pteropus melanotus*, Blyth. This revision is, I believe, in accord with the views of Dr. Gerrit Miller, Jr., who first directed attention to the ambiguousness of the earlier identifications.

The bat described by Peters as *Pteropus condorensis*<sup>1</sup> has been referred by Dobson to this species (*Monograph of the Asiatic Chiroptera*, 1876, p. 18). Although related to *Pt. melanotus* in some characters, it is quite a distinct and characteristic form, confined to the distant island of Pulo Condor in the China Sea, lying off the Annamese coast, about lat. 8° 40' N., long. 106° 42' E. Some of the small islands adjoining the Acheen coast of Sumatra (Pulo Way, Pulo Brasse, etc.) have, I think, been confounded by Dobson with this far-off island, his references in the habitat given for *Pteropus nicobaricus* in the *Monograph of the Asiatic Chiroptera* leading one to this inference. That these islands are inhabited by a species of *Pteropus* we possess ample evidence. It also occurs on the mainland, and what I take to be the same species has been recorded as far south as Nias Island. I cannot, however, agree as to the specific identity of these bats with *Pteropus melanotus* (= *nicobaricus*), which, I think it will be found, is peculiar to the Nicobar group, while the Sumatran bat is a not yet differentiated species. To decide this point, however, it will be necessary to acquire a far larger and more representative collection of specimens than is at present available for study.

Both male and female specimens of *Pteropus melanotus* closely resemble one another in the coloration of the fur, exhibiting but little variation from that which was so accurately recorded by Blyth,<sup>2</sup> and described later, in much more detail, by Dr. G. Miller, Jr.,<sup>3</sup> differing greatly in this respect from the following species,

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<sup>1</sup> *M. B. Akad., Berlin*, 1869, p. 393.

<sup>2</sup> *Journ. Asiat. Soc. Bengal*, xv, p. 367.

<sup>3</sup> *Proc. U. S. Nat. Mus.*, xxiv, p. 784.

about to be described, of which the two sexes might readily be mistaken at first sight for distinct species.

TABLE OF MEASUREMENTS OF *Pteropus melanotus*.

	Head and body.	Tibia.	Foot.	Calcar.	Forearm.	Thumb.	Second digit.	Third digit.	Fourth digit.	Fifth digit.	Ear from meatus.	Ear from crown.	Width of ear.
	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
Blyth's type (female).	266	65	46	13	148	65	110	278	215	189	28	23	15
Male, Galatea River, Gt. Nicobar.	273	77	52	14	163	72	116	280	225	190	30	25	18
Female, Galatea River, Gt. Nicobar.	283	78	45	16	170	75	120	293	223	202	30	23	21

*Pteropus tytleri*, sp. nov.

*Pteropus tytleri*, Blyth, in litt.

1873. *Pteropus nicobaricus*, Dobson. *Journ. Asiat. Soc. Bengal*, xlii, pt. 2, p. 198 (*partim*).
1876. *Pteropus nicobaricus*, Dobson, *Monogr. Asiat. Chiropt.*, p. 17 (*partim*).
1878. *Pteropus nicobaricus*, Dobson, *Cat. Chiropt. B. M.*, p. 54 (*partim*).
1891. *Pteropus nicobaricus*, Blanford, *Fauna Brit. Ind. Mamm.*, p. 260 (*partim*).

Again, quoting from the appendix to Dr. Mouat's *Adventures and Researches among the Andaman Islands* (1863), p. 353, attention is directed by Blyth to the entire absence of any representative of the genus *Pteropus* in the Andaman group, although the species, *Pteropus melanotus*, as we have seen, is frequent on most of the islands comprised in the adjacent Nicobar Archipelago.

In the year 1864, however, Lieut.-Colonel R. C. Tytler, the Officiating Governor at the Port Blair Penal Settlement, who contributed largely to our knowledge of the fauna of the Archipelago during his term of residence, transmitted to the Museum of the Asiatic Society the first authentic specimens of an Andamanese *Pteropus* procured in the neighbourhood of the Settlement; and Blyth, who examined the specimens, found he was unable to refer them to any existing species of the genus, and accordingly adopted the MS. and unpublished name of *Pteropus tytleri*, for the species. The original labels, in Blyth's handwriting, are still attached to the specimens.

The present form is a most distinct and good species, bearing some resemblance to *Pteropus celæno* in colour only; and it is owing to this fact, I believe, its supposed identity with that well-known and widely distributed form has been generally accepted, and the specific distinction of the species so long ignored. As a matter of fact *Pteropus celæno* is only a straggler in the Nicobars, and appears to be absent altogether from the whole of the Andaman Islands, all records which have come to us being really founded upon examples of the species now under discussion. From these circumstances it will not perhaps appear so much a matter of speculation that such a characteristic and well-defined type should have escaped earlier notice.

Dobson, in his paper "On the Pteropidæ of India and its Islands" (*Journ. Asiat. Soc. Bengal*, xlii (1873), p. 198), very correctly expressed much doubt as to whether he was not at fault in associating under the one name both the Nicobar and Andamanese bat; he even went so far as to submit examples to Professor Peters. The vague statement furnished by that authority "that they agree in the form of the ear and feet" with Zelebor's type in the Vienna Museum led him, we are told, to accept unreservedly this view also, and to unite the two forms. Had he had before him a representative series of specimens he could scarcely have failed to realize the error of a conclusion based as it was upon such slight and unstable characters.

This species is generally distributed among the islands of the Andaman group; the stretch of ocean known as Ten-Degree Channel, separating Little Andaman from Car-Nicobar, forms its southern barrier. Dr. Anderson was in error when he extended its range to the Nicobars. Through the kindness of Dr. Annandale I have been enabled to examine the original skin, No. 92 f. of the Catalogue, which Anderson records as black, with the nape faintly chestnut, and as coming from the South Nicobars; it fortunately still retains Blyth's label, and this shows Dr. Anderson wrongly transcribed the locality he attributed to it. The specimen is one which was contained in the original collection formed by Lieut.-Colonel Tytler, and is, like the rest of the examples in the series, from the Andamans, as the label testifies. *Pteropus tytleri* occurs on Barren Island, where it shows a tendency to deteriorate in size and further deviates from specimens collected in the type locality by having a light and conspicuous oval-shaped area of greyish hairs occupying the chest and stomach. This is the first recorded instance, I believe, of any species of *Pteropus* having been taken on Barren Island; the specimens were collected by Mr. B. B. Osmaston.

*Description of the type, an adult male (skin), collected on Rutland Island, South Andamans, March 5th, 1907, by Mr. B. B. Osmaston.*

Ears of medium length, naked, projecting much beyond the short fur; their anterior and posterior edges nearly equally concave, finishing with a bluntly-pointed tip. The whole of the head,

throat and under parts deep black; posterior back black, the fur closely adpressed, 40 mm. broad at the narrowest parts; muzzle black, sparingly covered with hair; mantle conspicuous and well defined, a dark canary, changing to orange at the margins and weakly developed orange-coloured tufts on shoulder glands. Fore-limbs and membranes nearly naked above, a few hairs only extending along the upper side of the humerus and forearm; upper and posterior sides of thighs very furry; lower legs naked. Below, the fur sparingly covers the antebrachial membrane, the humerus, femur, and the wing-membrane internal to them, and also passes along the outer side of the forearms in a narrow band of weakly-developed hair. The uropatagium membrane is well developed but entirely concealed by the fur between the knees and body.

The general characters of the teeth are the same as in *Pteropus melanotus*,—strong and heavy, with well-developed basal cusps. Anterior upper premolar minute, other premolars produced horizontally, their length equal to once-and-a-half their breadth. Last molars above and below large and well developed, above more than one-half and below scarcely one-half of the penultimate molars. Anterior lower premolar of equal size to last molar, separated from the canine and next premolar by diastemata each equal to its own diameter.

*Skull.*—Greatest length, 70 mm.; condylobasal length, 63; basilar length, 61; median palate length, 37; palatal breadth between anterior molars, 13; zygomata breadth, 36; least interorbital breadth, 10.5; breadth between tips of postorbital processes, 28; greatest breadth of brain case above roots of zygomata, 23.8; greatest depth of brain case, 18; occipital depth, 12; depth of rostrum at middle of diastema, 10; mandible, 58; maxillary tooth row exclusive of incisors (alveoli), 28; mandibular tooth row exclusive of incisors (alveoli), 31.

The dimensions of this specimen will be found in the table of measurements.

An old female from the type locality is intensely black throughout, the head inclined to greyish, and the mantle only very faintly distinguishable; with other specimens it is more conspicuous, but in no case so strong in colour as the males. The individual variation in a series is very great, scarcely any two being alike; a very young example, with head and body only 140 mm., shows the bright collar very clearly, which is produced and completely encircles the throat.

A skin in my collection, from Little Jolly Boy Island, that was collected by Hume in 1873 and referred to *Pt. nicobaricus*, belongs to the present species.

TABLE OF MEASUREMENTS OF *Pteropus tytleri*.

	Head and body.	Tibia.	Foot.	Calcar.	Forearm.	Thumb.	Second digit.	Third digit.	Fourth digit.	Fifth digit.	Ear from meatus.	Ear from crown.	Width of ear.
	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
Male (type) Rutland Island.	275	68	46	15	150	70	113	300	237	217	34	29	19
Female, Rutland Island.	277	74	48	14	148	85	113	299	232	209	34	28	19
No. 92 f. Indian Museum (Tytler, 1864).	261	71	36	12	125	55	110	300	225		32	23	16
Male, Barren Island.	250	66	40	13	165	66	110	283	221	197	25	20	17
Female, Barren Island.	257	63	36	12	160	55	105	254	205	190	22	17	17

*Pteropus celæno*.

1758. *Vespertio vampyrus*, Linn., *Syst. Nat.*, Ed. x, 1, p. 31 (*partim*).

1804. *Vespertio celæno*, Hermann, *Observ. Zool.*, 1, p. 13.

1810. *Pteropus edulis*, Geoffroy, *Ann. Mus.*, xv, p. 90.

This species ranges throughout the Nicobar Island as a migrant, but has a very local distribution, arriving generally during April at the commencement of the south-west monsoon and leaving again about September. The naturalists attached to the "Novara" expedition, however, met with it on Car-Nicobar during their stay in February and March, which shows a general exodus of the species does not take place. I have no record of this form extending its range into the Andamans, although I have made special enquiries for it.

I examined a skull from the Mergui Archipelago which has been attributed to *Pteropus nicobaricus*; it proved, however, to be a characteristic specimen of the species now under review.

*Pteropus medius*.

1827. *Pteropus medius*, Temm., *Monog. Mammal.*, 1, p. 176.

The Indian Flying Fox occurs in the Andamans as an occasional and rare straggler, and has only been met with at two points on North Andaman Island—Reef Inlet, and in the neighbourhood of Cape Price.

It is, I believe, unknown in the Nicobar Archipelago.

*Pteropus faunulus.*

1902. *Pteropus faunulus*, Miller, *Proc. U. S. Nat. Mus.*, xxiv, p. 785.

I can add little to Dr. Miller's excellent description of this interesting form. The only specimen I have examined belongs to the same sex (male) as the type specimen, with which it closely agrees in all essential details. The forearm, however, measures 121 mm.

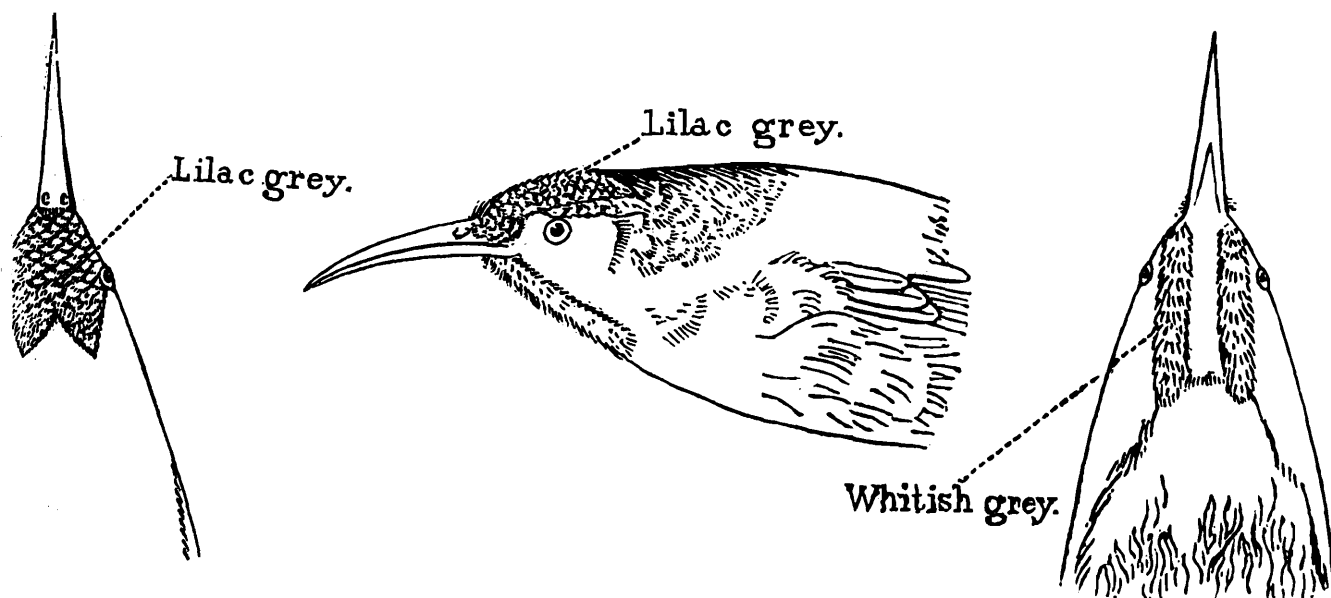
Of the habits of this bat I could gain little information; it feeds principally upon plantains, shaddock, and papaya, and only occurs in small parties of twos and threes. When disturbed it clings immovably to the under sides of the leaf or bough upon which it may be resting, showing no sign of life when its means of support is violently disturbed, or the animal itself actually touched.

In conclusion I beg to acknowledge the most kind assistance rendered me by Major W Browning and Mr. B. B. Osmaston, and also by Dr. Lorenz, of the Naturhistorisches Hofmuseum, Vienna, who forwarded the type specimen of *Pteropus nicobaricus* to London for my inspection.

XIX.—A NEW SPECIES OF SUN-BIRD  
(*ÆTHOPYGA*) OBTAINED NEAR  
DARJILING, BRITISH  
SIKHIM.

By T. BENTHAM, *Indian Museum.*

This specimen was shot by myself, together with two examples of *Æthopyga nepalensis* (the Nepal Yellow-backed Sun-Bird), in the forest at Ghoom, near Darjiling. It differs in several strongly-marked points from *Æ. nepalensis*. A coloured drawing of the specimen was submitted to Capt. Walton some time ago, and that gentleman, who is well known as an authority on the birds of Sikhim, said that in his belief the bird was probably a new species. I propose, therefore, to call it *Æthopyga griseiceps*, Benth. (the



Grey-headed Sun-Bird), the grey head being the chief point in which it differs from other Indian Sun-Birds. The symmetry and regularity of the pale markings on the head and throat render it improbable that these markings are due to immaturity.

*Description—*

Forehead and crown dull lilac-grey, each feather with a dull buff centre spot; nape, hind neck, chin and throat, metallic green; sides of head dull black; a broad whitish grey moustachial streak on each side of the throat extending from the base of the bill to the yellow of the breast and dividing the green of the throat from the black of the side of the head. The rest of the plumage as in *Æ. nepalensis*.

Length 5·5"; tail 2·5"; wing 2·1"; tarsus ·55"; bill from gape ·9"

## XX.—THREE INDIAN PHYLACTOLÆMATA

By N. ANNANDALE, D.Sc., Superintendent, Indian Museum.

### *Plumatella bombayensis*, sp. nov.

Allied to *P. tanganyikæ*, Rousselet.

Zoëcia short, stout, with thick walls, closely adherent to and even embedded in solid objects, densely pigmented throughout, with a strong keel and furrow on their proximal half, almost triangular in cross-section in this half, but oval in the distal half; their free extremity truncated, often oblique, sometimes trumpet-shaped; the walls of the zoëcium irregularly annulated towards the distal end, and often constricted a short distance below the tip, the base of some zoëcia irregularly inflated. The polypide with a small lophophore, which bears about thirty

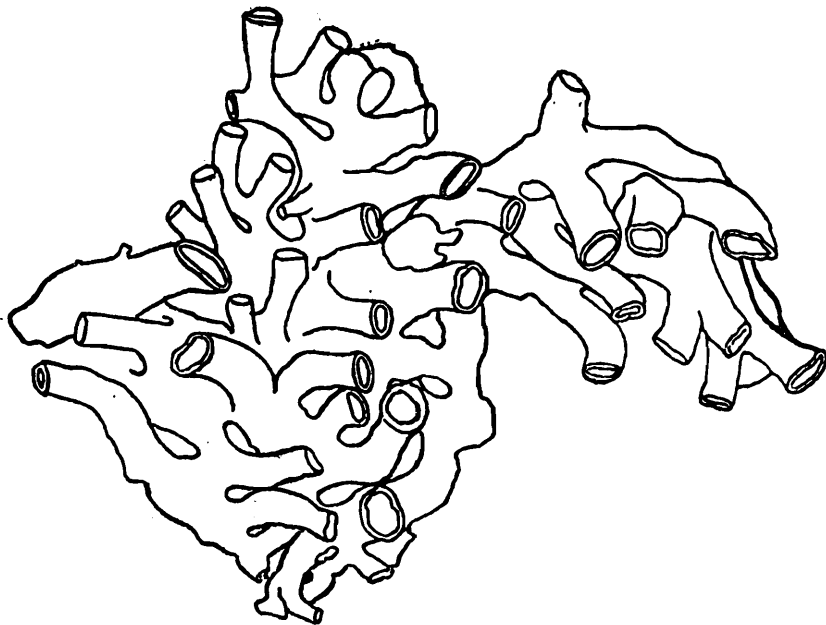


FIG. 1.—Part of a colony of *P. bombayensis*,  $\times 16$ .

tentacles; base of the stomach rounded. Free statoblasts few, elongate, often irregular in outline; the swim-ring well developed and broad; the central capsule profusely and regularly tuberculate. Fixed statoblasts broadly oval, surrounded by a chitinous ring which is often produced irregularly at several or many points and is devoid of reticulate markings.

*Habitat.*—On lower surface of stones in a lake and pond at Igatpuri, Western Ghats, Bombay Presidency. November, 1907; N. Annandale *leg.* Often covering a considerable area; many of

the zoaria dead and decomposed, in some only fixed statoblasts remaining.

I am by no means sure that this form is more than a local race of Mr. C. Rousselet's *P. tanganyikæ*, of which, by the kindness of Mr. R. Kirkpatrick, I have been able to examine one of the types. I have, however, submitted a specimen of the Bombay form to Mr. Rousselet, who considers it quite distinct, suggesting that it may be related to Allman's *P. fruticosa*, on account of a similarity in the measurements of the statoblasts he himself has examined. But what I call *P. fruticosa* is a slender species with more or less free colonies, a faintly tinted cuticle, and a rounded distal extremity to the zoëcia; and in my diagnosis of this form I follow Allman's figures (*Mon. Freshwater Polyzoa*, pl. vi). My new species possesses none of these characters and differs from *P. tanganyikæ* only in the following points: (1) its darker colour; (2) its strong keel, which gives its basal half almost a triangular outline in cross-section; and (3) its possession of free statoblasts. It resembles the African species in characters perhaps more important, *viz.*, in its annulate and truncated zoëcia and its habit of partially embedding its colonies in the substance to which it adheres.

The truncate appearance of the zoëcia is naturally most distinct when the polypides are contracted. In this condition the zoëcia apparently resemble those of *P. philippinensis*, Kraepelin, between which and the African form *P. bombayensis* is evidently in some respects intermediate. When the polypides are expanded it is seen that there is a much sharper division between the zoëcium proper and what Allman calls the tentacular sheath than there is in most species of the genus, in which, as a rule, the chitinized cuticle fades away gradually at the distal extremity of the zoëcium, giving place to a soft membrane. In *P. bombayensis* and *P. tanganyikæ*, however, and apparently in *P. philippinensis* also, the walls of the zoëcium are unusually stout and terminate abruptly, the tentacular sheath and the parts immediately adjacent to them being extremely delicate and collapsing completely when the polypide is drawn into the aperture.<sup>1</sup> In *P. emarginata*, which resembles these forms to some extent in the thickness of the walls of the zoëcia, although the zoëcia themselves have a much smaller diameter, the aperture is as a rule more or less lateral, not terminal, and is approached by a distinct triangular patch of rather stout but almost transparent membrane situated on the upper surface of the zoëcium, the tip of which is rounded even when the polypide is fully contracted.

As I find that the statoblasts of the Indian forms of *Plumatella* do not afford, in their exact actual or proportional measurements, any safe specific criterion, I have purposely omitted to give measurements of those of *P. bombayensis*; but I may say that, in the few specimens I have examined, the breadth equals about two-thirds

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<sup>1</sup> Probably *P. aplinii*, MacGillivray, from Australia (*Trans. Roy. Soc. Victoria*, v, p. 203, 1860) also belongs to this group, but the description is very incomplete.

of the length, and that the central capsule is about three-fourths as broad as long. The statoblast has thus neither the attenuated outline of that of *P. philippinensis* nor the broadly oval form of that of the typical *P. repens*. The form might, therefore, so far as the proportions of the statoblasts are concerned, fall into either of Kraepelin's two species *P. polymorpha* and *P. princeps*, which represent respectively the group related, as regards this character, to *P. repens* and that related to *P. emarginata* in the same way.

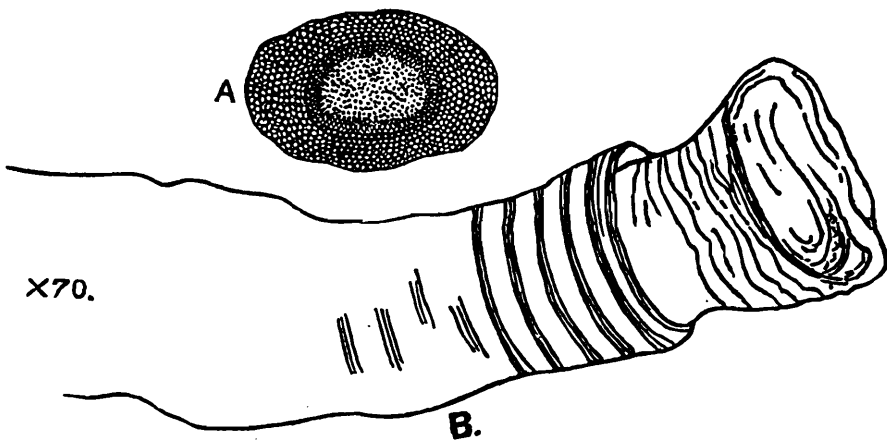


FIG. 2.—*P. bombayensis*: statoblast (A) and distal part of a zoecium (B), both  $\times 70$ .

### *Lophopus carteri* (Hyatt).

Zoaria consisting of small, mound-shaped, colourless masses of gelatinous consistency, which have the power of progression without any specialization of the base and are capable of coalescing by means of their gelatinous investment to form compound colonies of a temporary nature. Zoecia tubular, upright, rather short; their walls consisting of an inner cellular layer and an outer gelatinous one devoid of cells in the living organism. Stomach yellow, rounded, but not broadly, at the base; lophophore bearing about sixty tentacles, which are distinctly webbed at their point of origin. Statoblasts (fig. 3) large, somewhat variable in size and proportions, but averaging about 0.85 mm. by 0.56 mm., truncately oval in outline, curved longitudinally, with a wide swim-ring and an almost circular capsule, which is relatively small; the statoblast bearing at each end a series of straight processes, each of which is armed with a row of minute, blunt hooks on either side.

This form only differs from my *L. himalayanus* in the larger number of tentacles borne by its lophophore, and in the more perfect development of the processes on the statoblasts. In *L. himalayanus* these are sometimes reduced to minute rudiments (fig. 4) in statoblasts proved by their dark colour and by the fact that they are found floating free in large numbers, to be

mature. The arrangement of the zoëcia in these two forms agrees more closely with that found in *L. crystallinus* than with that found in *L. lendenfeldi*, which is further distinguished by the comparatively small size of its statoblast. By the kindness of Mr. R. Kirkpatrick

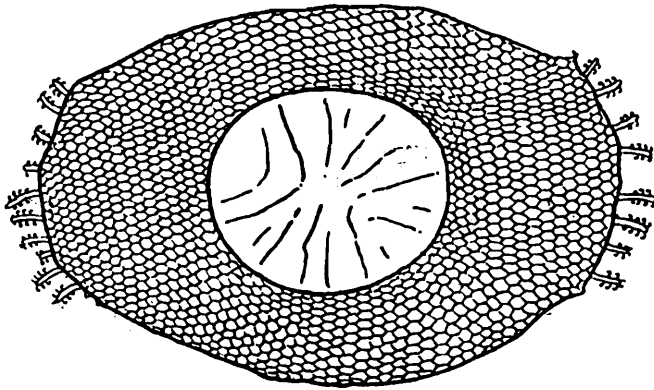


FIG. 3.—*L. carteri*: statoblast from Igatpuri Lake, W. Ghats,  $\times 70$ .

I have lately been able to examine a specimen of this Australian form, regarding which I am therefore in a position to express a more definite opinion than I was when I wrote my former note on the Himalayan form (*Rec. Ind. Mus.*, i, p. 145), in which I stated that the two were probably identical specifically. Even in *L. lendenfeldi*, judging from an examination of this specimen, cells are probably absent from the gelatinous investment in the living organism, although in specimens preserved in spirit those of the inner layer are apt to be forced out of their natural position. This is certainly the case in the two Indian forms and in *L. crystallinus*, in all of which this artificial phenomenon occurs. The cells

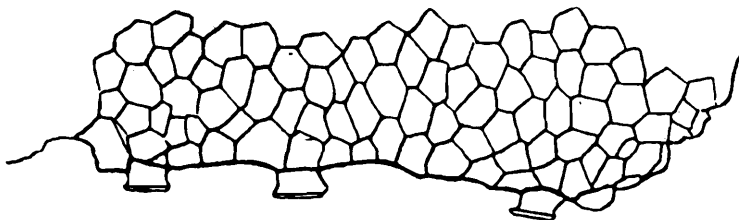


FIG. 4.—*L. himalayanus*: extremity of statoblast,  $\times 240$ .

of the inner layer, however, are distinctly larger in the Indian and Australian forms than they are in *L. crystallinus*, and are apparently more easily displaced. In *Plumatella punctata* not only have these cells all the characters of its genus, but the stiffer consistency of the cuticle, swollen though it is, prevents them from being forced into it artificially.

As regards the generic position of *L. carteri*, I have already stated (*Rec. Ind. Mus.*, i, p. 147) that I see no reason to separate it from the genus to which Carter assigned it. It must be confessed,

however, that, in order to include it, the definition of this genus must be modified, and that it is very difficult to draw an exact line between *Lophopus* and *Pectinatella*, if the younger stages of the colonies of the latter are to be taken into account, and if the Indian forms are to be placed in the former. Moreover, the Japanese forms (*Pectinatella gelatinosa* and *P. davenporti*) do not altogether agree with the only other fully described species of their genus, viz., *P. magnifica* of N. America and the continent of Europe. Unfortunately I have not yet been able to obtain a copy of the full account of *P. davenporti*, which is published by the Japanese Zoological Society, and am therefore forced to rely on the summary thereof published by Oka, the author of the species, in the *Zool. Anzeiger*, vol. xxxi, No. 23, May, 1907. Mr. Rousselet has, however, drawn my attention to the close similarity between the statoblasts of this form and those of *L. carteri*.

Further, there is a certain biological resemblance between *L. carteri* and the species of *Pectinatella*. Oka (*Journ. Coll. Sci. Tokyo*, iv, 1891) has described *P. gelatinosa* as forming gigantic compound colonies by the coalescence of numerous small zoaria, each of which arises from a single statoblast; and a somewhat similar phenomenon occurs in *P. magnifica*. I found large numbers of small zoaria of *L. carteri*, grouped together but quite distinct from one another, on the under surface of stones in the lake at Igatpuri in November last. They were apparently adult zoaria and most of them bore mature statoblasts. When they were detached from their support, however, and placed in a bottle of water, several of them coalesced so as to become, to the naked eye, a single colony, although a microscopic investigation revealed the fact that it was only the gelatinous investment that had taken part in the coalescence. Such compound colonies did not appear to be permanent, nor did I see any in natural conditions. Moreover, they showed no tendency to secrete a common basal membrane, as the components of the large colonies of *Pectinatella* do.

On the leaves of a tree whose branches dipped into the water of a lake at Kawkareik in the interior of the Amherst district of Tenasserim I found, in March last, a number of similar zoaria, quite independent of one another. They differed from those taken in the Bombay Presidency in autumn in the following characters: (1) their cœnœcium had a decided yellow tinge; (2) their polypides were larger; and (3) they bore no statoblasts. It is just possible that these were young colonies of the form described below, on the evidence of a statoblast from the same lake, as *Pectinatella burmanica*; but their zoœcia were upright and the histological similarity between them and zoaria of *L. carteri* was so close that I think they must have represented this species. If they belonged to the same species as the statoblast found in their vicinity, it would, in my opinion, be impossible any longer to separate the two genera; but this is a point on which it is not yet possible for me to express a definite opinion.

*Pectinatella burmanica*, sp. nov.

Animal unknown. Statoblast dark brown in colour, very large, almost circular, measuring  $1.56 \times 1.75$  mm., curved longitudinally; the central capsule relatively small, measuring  $0.458 \times 0.63$  mm. Circumference armed with numerous minute hooked processes with a very short stem and often irregular or abortive in form.

*Habitat*.—Lake at Kawkareik, interior of Amherst district, Tenasserim. March, 1908; N. Annandale *leg.*

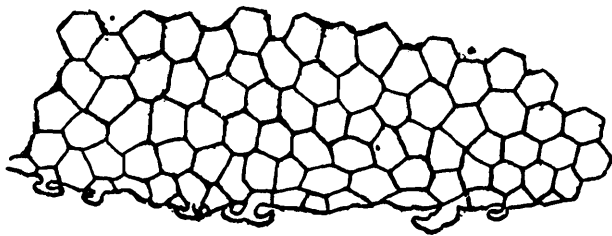


FIG. 5.—*Pect. burmanica*: part of periphery of statoblast,  $\times 240$ .

This statoblast was found attached to the protective tube of the Oligochaete worm *Aulophorus tongkinensis*, a most industrious collector of gemmules and statoblasts, whose tubes, so common in Indian ponds and lakes, generally afford some indication of the sponges and polyzoa to be found in the locality in which they are taken. Together with the specimen figured were statoblasts of a species of *Plumatella* and of two genera of sponges, all fastened to the tube of a single worm. So far as it is possible to say without examining the animal, *Pectinatella burmanica* is related to *P. gelatinosa*, Oka, from Japan, whence I have received some mounted statoblasts from Mr. C. Rousselet. The statoblasts of the latter form are, however, subrectangular in outline and their processes are more numerous and much more constant in form. As regards its shape, the statoblast of the new species somewhat resembles that of *Lophopus jheringi*, Meissner, but the latter is considerably smaller ( $0.8 \times 1.0$  mm.) and apparently lacks processes of all sorts. As regards the distorted and often degenerate nature of the hooked processes *P. burmanica* resembles *Lophopus himalayanus*, but in the latter form the processes are often more complex and, when they occur, are invariably confined to the extremities of the statoblast; the latter being a feature which may serve to distinguish *L. carteri* as well as *L. himalayanus* (if these two are specifically distinct from one another) from all species of the genus *Pectinatella*.

XXI.—ON TWO NEW SPECIES OF EAGLE-  
RAYS (*MYLIOBATIDÆ*), WITH NOTES  
ON THE SKULL OF THE GENUS  
*CERATOPTERA*.

By R. E. LLOYD, M.B., B.Sc., Capt., I.M.S., formerly Surgeon  
Naturalist, Marine Survey of India.

During a brief collecting trip to Puri, on the Orissa Coast, recently taken in conjunction with Dr. N. Annandale, we were informed that a gigantic fish had been lately caught in the seine net of some local fishermen, who regarded the capture as a most unusual event. Search was made for evidence of this story, with the result that a portion of an immense ray was found almost buried in sand close to high-water-mark.

The specimen, although in an advanced stage of decomposition, was covered with tough skin, so that the form of the head was completely preserved. From the appearance of the wide mouth, gaping directly forwards and flanked by two cephalic flippers, the fish was recognised to be one of those rays which, owing to their gigantic size, are rarely captured, and still less often appear in Museum collections. The specimen, which measured three feet nine inches across the head from eye to eye, was despatched to the Indian Museum.

Unfortunately the great pectoral fins had been cut off at the time of its capture, but the complete head and shoulder girdle with the intervening gill bars were obtained. A detached tail-like portion of vertebral column was found close by, bearing a median dorsal fin and a curious rounded knob (plate v, fig. 3). From the character of the skin this was seen to be part of the same remarkable fish. The dorsal fin in the *Myliobatidæ* is situated at the hinder end of the disc between the pelvic fins; this detached portion must therefore belong to the disc and not to the tail; furthermore, the anterior end of it fits on to the exposed centrum which terminates the vertebral column behind the shoulder girdle.

The *Myliobatidæ* are by some authors divided into two groups, —*Myliobatina* and *Ceratopterina*. It will be shown further on that this division is highly justifiable. It is difficult to imagine two structures more unlike one another than the skulls of *Ceratoptera* and *Aëtobatis*, the latter genus being taken as an example of the *Myliobatina*.

The group *Ceratopterina* contains three genera, two of which have been long known. All three are characterised by possessing

long cephalic flippers or horns one on either side of the head. They may be briefly defined thus—

- (1) *Dicerobatis* (Blainville) has an inferior mouth, teeth in both jaws, and a smooth skin.
- (2) *Ceratobatis* (Boulenger) like *Dicerobatis*, but teeth restricted to the upper jaw.
- (3) *Ceratoptera* (Müller and Henle) has an anterior mouth, teeth in the lower jaw only, and numerous denticles on the skin.

Our specimen from Puri evidently belongs to the last of these (*Ceratoptera*), although the genus has not been hitherto recorded from the Bay of Bengal,<sup>1</sup> and is known from only a very few specimens.

Two species have been recognised: *Ceratoptera vampyrus* (Duméril), found in American seas, bears 100 series of teeth on the lower jaw (this is the *Manta birostris* of American writers, the much-dreaded devil fish of the Panama pearl fisheries); the other, *C. ehrenbergii*, bears 200 series of teeth, seven in each series, and is found in the Red Sea.

In a footnote to page 498 of his *Catalogue of Fishes*, vol. viii; Günther writes: "On an unpublished<sup>2</sup> plate of the *Symbolæ Physicæ* this species" (*C. ehrenbergii*) "is named *Cephaloptera stelligera*; the horns are horizontally bent inwards." Reference to this plate shows that our specimen from Puri bears a considerable resemblance to the species from the Red Sea; even the denticles of the skin, which are clearly depicted, show a marked similarity in the two cases. In the *Symbolæ Physicæ* each denticle is shown as a stellate (usually six-rayed) base bearing a bluntly pointed tubercle which in some cases shows slight irregularity. It is possible that the horns may have been bent inwards during life but our photographs (plate iv) show what seemed to be the natural position of these appendages.

*Ceratoptera orissa*, sp. nov.

The specimen from Puri, for which the name *Ceratoptera orissa* is proposed, is differentiated from the others by the following features:—

- (1) The dentition of the lower jaw is in 370 series, each consisting of 14 teeth. In their peculiar columnar form and in the regularity of their arrangement, the teeth show a close similarity to those depicted in the *Symbolæ Physicæ*. Each tooth is separated by a well-marked interspace from its neighbours (text-fig. 1).

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<sup>1</sup> Day, relying on a woodcut published by Sir Walter Elliot, has provisionally included *Ceratoptera* among the fishes of India. A comparison of this woodcut with the figure in the *Symbolæ Physicæ* and with our specimen from Puri shows, however, that this woodcut cannot be regarded as a representation of *Ceratoptera*.

<sup>2</sup> Published subsequently in *Symbolæ Physicæ*, Berlin, 1899.

- (2) Behind the dorsal fin is a remarkable globular swelling of the size of a man's fist (fig. 3, plate v). This is not present in the other species.
- (3) The denticles of the skin consist of a stellate base, usually six-rayed, which bears a multifid spine.

Other specific characters cannot be defined as the specimen was incomplete.

The diagram, plate x, fig 2, which is drawn to scale, shows the principal measurements of the head.

The upper surface of the head and adjacent portions of the disc were of a dark greenish grey colour contrasting sharply with the pure white of the oral surface.

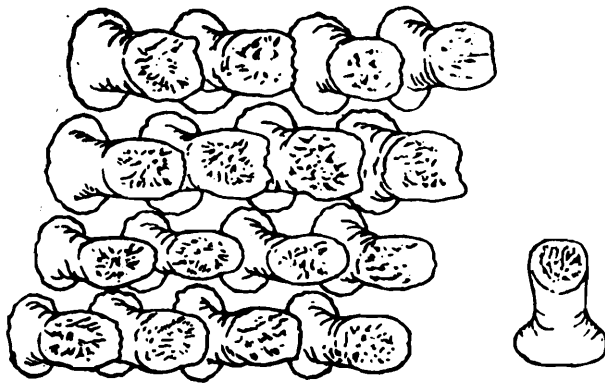


FIG. 1.—Teeth of *Ceratoptera orissa*, sp. nov.

The upper surface of the cephalic flippers and the sides of the head were white, as were the lower two-thirds of the ocular prominences.

The mouth was overhung by a thin curtain or velum of white skin; the depth of this curtain was about four inches except towards the middle where it was considerably reduced, allowing a view of the interior of the mouth.

This velum which is analogous to an upper lip, is quite distinct from the broad nasal flap; it resembles that structure and is attached behind it. Figure 2, plate v, shows these features, as well as the band of teeth on the lower jaw. Other measurements are as follows:—

Between the nostrils	61 cms.
Width of mouth	55 „
Dimension of the band of teeth	47 by 2.5 cms.
Greatest diameter of eyeball	7 „
Corneal aperture of eye	2 „
Greatest diameter of spiracle	5 „

The cranium of *Ceratoptera orissa* consists of a single lamina of cartilage measuring 95 cms. in breadth but only 20 in length in the middle line. The outer ends of this lamina turn forwards as two spatulate projections which lie over and support the bases of the

cephalic fins. The skeleton of these fins, as in the other members of the *Myliobatidæ*, is directly continuous with the skeleton of the pectoral fins. The actual brain case is a very insignificant part of the cranium, being represented by a dome-shaped box measuring only 13 cms. in breadth, situated close to the condyles.

With the exception of the small portion which lodges the brain, this cranial lamina has a uniform thickness of half an inch in the dried state. It terminates laterally in simple margins, hence the cranium appears to be devoid of true orbits. At one point, on either side, the dry cartilage composing these margins is prolonged outwards towards the eyes as two slender shrivelled tubes which doubtless contained the optic nerves. Owing to decay it was impossible to ascertain the point at which the ocular muscles were attached to the cranium; this point would have indicated the site of the orbit.

The eyes were well preserved for, as in many other large elasmobranch fishes, the sclerotic coat was composed of thick tough cartilage; in this case the cartilage composing the back of the eyeball was more than half an inch in thickness; it was indeed so massively developed that on first examination it was thought to be the orbit itself which had been attached to the cranial margin by the slender tubular prolongation beforementioned. This misunderstanding was corrected by finding traces of the tendinous insertions of the ocular muscles attached to the outer surface of the globe.

The jaws and their suspensory apparatus were of the type common to the order. The hyomandibular is laminate in form and is firmly attached at its upper (or inner) end to the cranium close to the occipital condyle of the same side; it also receives additional support by being, as it were, wrapped round the posterior margin of the cranial plate. Its lower (or outer) end supports the jaws and hyoid. The upper and lower jaw differ remarkably in appearance.

The upper jaw is a straight slender bar, no thicker than a man's thumb, attached at either end to the hyomandibulars. The lower jaw, which has, of course, the same attachments, is a massive plank-like structure measuring 12 cms. in depth; one surface of this looks upwards and forwards and bears the curious ribbon-like band of teeth which are detachable with the skin.

The lower edge of the mandible forms a prominent ridge sharply defining the oral face from the ventral surface; in the same way the anterior margin of the cranial lamina, which forms an open curve, sharply separates the oral face from the dorsal surface.

The skeleton, which carries the great pectoral fins on either side, is prolonged forwards beneath the spatulate processes of the cranium, to render support to the cephalic fins; beneath these processes it is united to the cranium itself by a cartilaginous bar which is fixed to the cranium just outside the nasal fossa (point X, fig. 1, pl. x).

In order that a better understanding of the cranium might be arrived at, the skull of *Aëtobatis*, a common genus belonging to the *Myliobatina*, was cleaned and examined.

This was so different from the skull of *Ceratoptera* that it has been shown in outline in fig 3, pl. x. The cranium of *Aëtobatis* is a box-like structure provided with well-developed orbits, that is to say it is not unlike the type found in many other elasmobranch fishes, but a great contrast to that of *Ceratoptera*. This difference is so marked that a separate origin for the two divisions of the *Myliobatidæ* might have to be admitted. In order to demonstrate this, an examination of the skulls of other genera of the family would be necessary.



FIG. 2.—Teeth of *D. eregoodoo*.

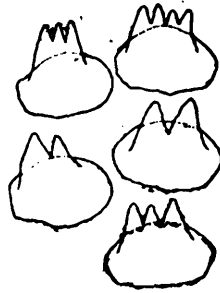


FIG. 3.—Teeth of *D. thurstoni*.

During a recent visit to Madras I had, through the kindness of Mr. E. Thurston, an opportunity of examining the large rays in the Museum of that city. Among them are two examples of *Dicerobatis* which clearly belong to separate species. Photographs of these are shown on plate iv. One of them agrees closely with the definition of *D. eregoodoo*, the species usually found in Indian seas, though by no means commonly. Cantor<sup>1</sup> gives a full description of this fish; regarding the teeth he writes: "the teeth are uniformly minute, flattened, of a pentagonal shape, with backwards-directed points; they have frequently two or three such points; they are generally twice broader than long. The upper jaw has 80, the lower jaw 94 rows of teeth." The teeth of the specimen in the Madras Museum has 60 rows of teeth in the upper jaw, but in form (text-fig. 2) they agree with Cantor's description; the teeth of the same species are shown by Duméril<sup>2</sup> in a figure which shows some slight difference. In spite of this the smaller Madras specimen should, I think, be placed in the species *D. eregoodoo*. The larger specimen is quite different, however; it has twice as many teeth, which are of a different character. As it does not appear to resemble any known species it has been described here.

*Dicerobatis thurstoni*, sp. nov.

Teeth in 140 series in the upper jaw, extending nearly to the angle of the mouth. Each tooth is separated from its neighbours by an interval, and consists of an irregular nodular base bearing from two to four spinous cusps (text-fig. 3).

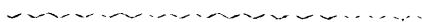
<sup>1</sup> *Catalogue of Malayan Fishes*, p. 1420.

<sup>2</sup> *Hist. Nat. des Poissons*, pl. 6, figs. 2—5.

The teeth of the lower jaw could not be counted in the dry specimen as the lip was curled over; they seemed to be about as numerous as those of the upper jaw. Tail smooth, less in length than the disc, and without a spine. Proportions generally like *D. eregoodoo*, but the cephalic fins are relatively shorter than in that species; furthermore, the termination of the disc between the cephalic fins is wider, and forms a more open curve (more nearly a straight line) than in *D. eregoodoo*.

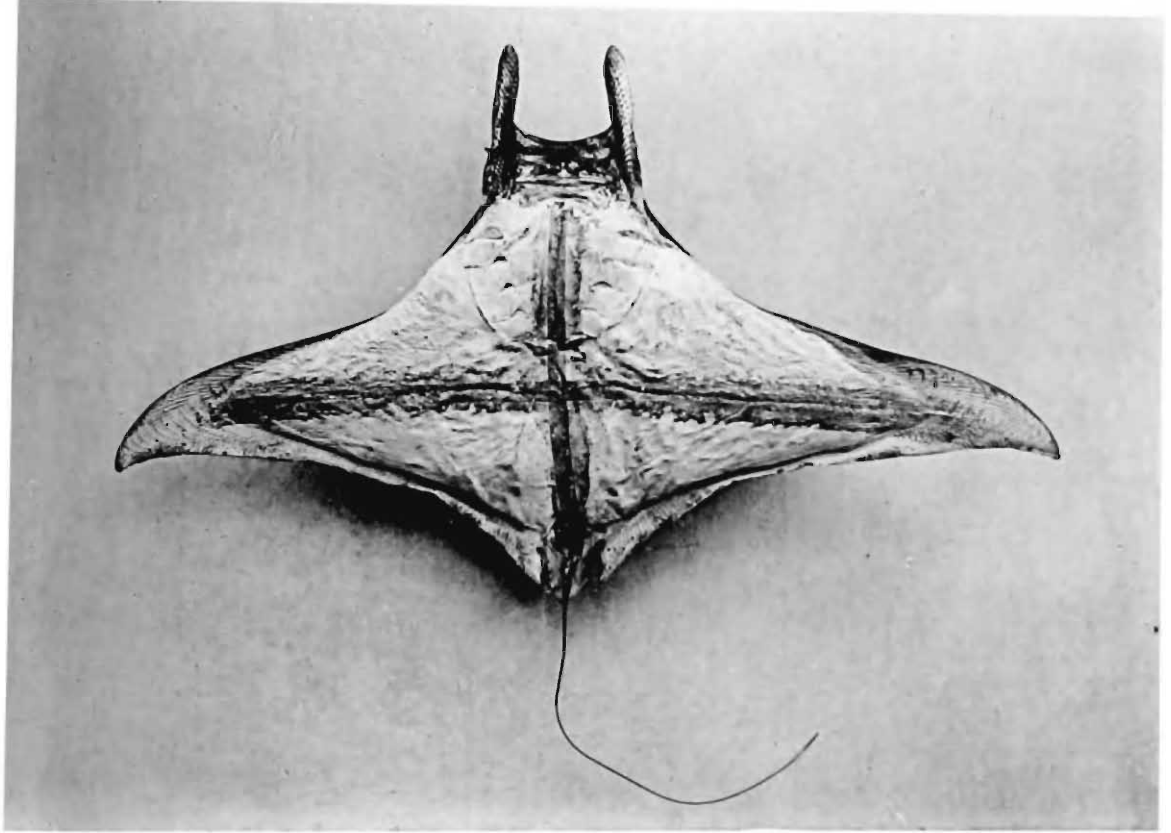
The measurements of the dry specimen are as follows:—

Greatest breadth	160 cms.
Length of disc in the middle line (excluding pelvic fins)	73 „
Distance between the eyes	27 „
Eye to tip of cephalic fin	13 „
Nostril to nostril	16 „
Spiracle to posterior border of the eye	4.5 „
Length of tail	53 „

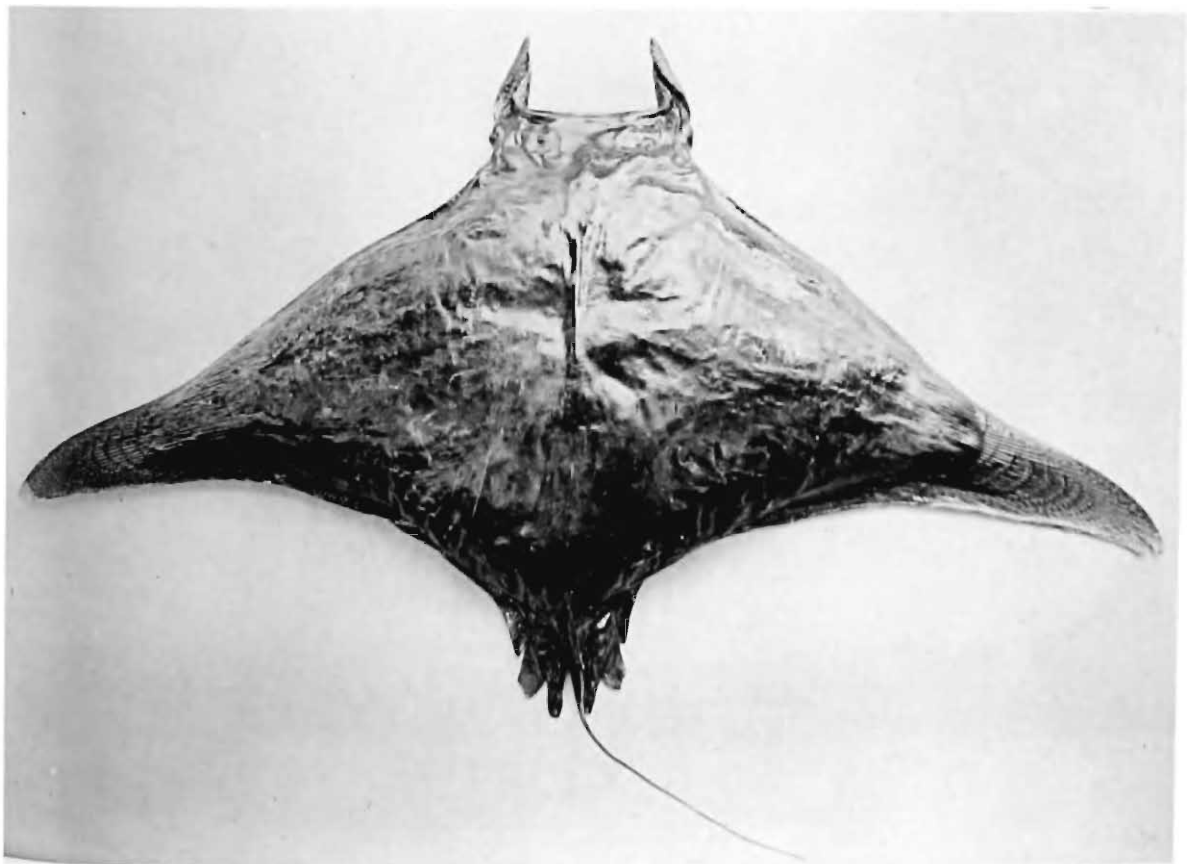


EXPLANATION OF PLATE IV.

- FIG. 1.—*Dicerobatis eregoodoo*, ventral surface,  $\frac{1}{8}$  nat. size.  
,, 2.—*D. thurstoni*, dorsal surface,  $\frac{1}{11}$  nat. size.



*Fig. 1.*

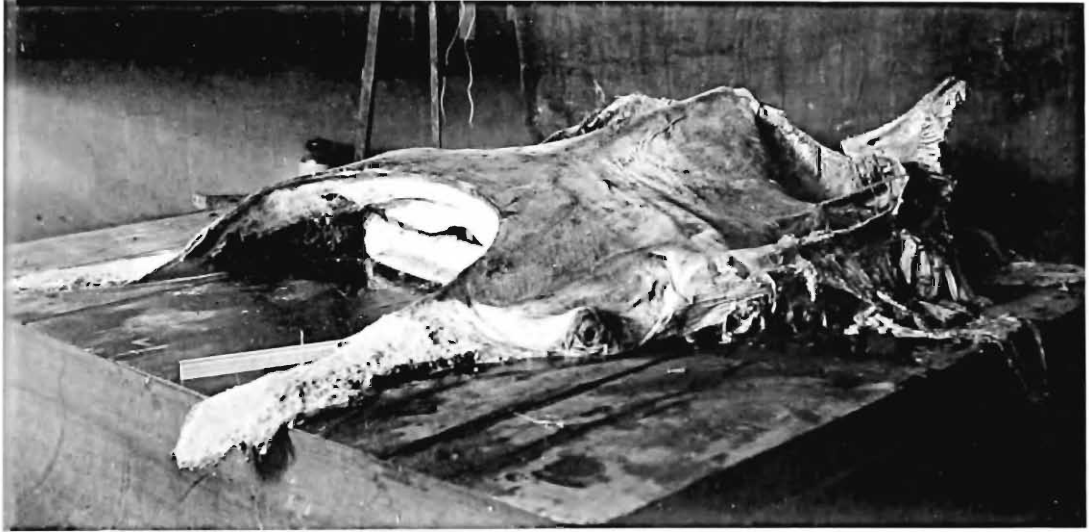


*Fig. 2*

EXPLANATION OF PLATE V.

FIGS. 1 AND 2.—Side and front view of the head of *Ceratoptera orissa*,  $\frac{1}{16}$  nat. size. In fig. 2 the band of teeth can be seen close to the lower margin of the mandible; black paper has been placed in the left nostril.

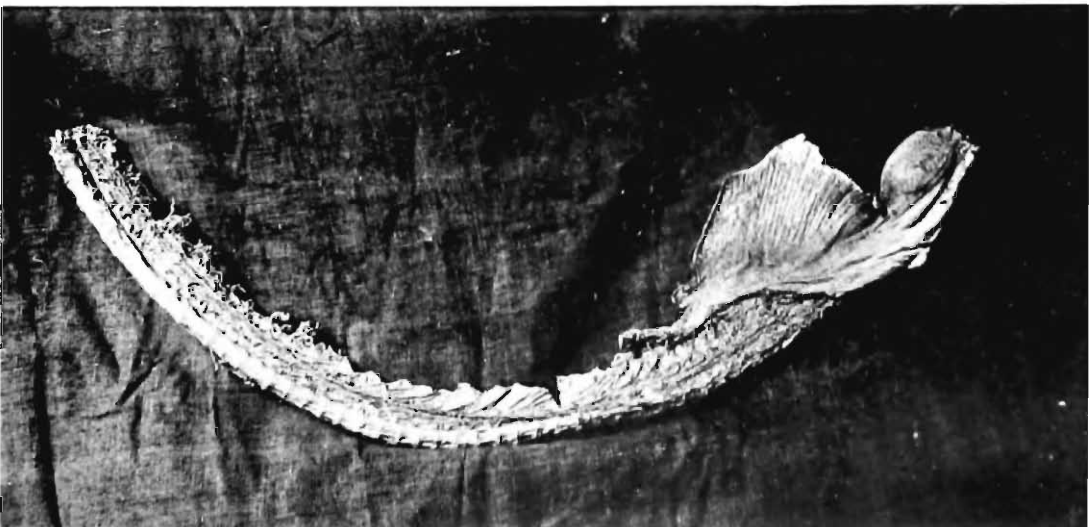
FIG. 3.—Vertebral column and dorsal fin of the same fish.



*Fig. 1.*



*Fig. 2*



*Fig. 3.*

### EXPLANATION OF PLATE X.

- FIG. 1.—Diagram, to scale, of the skull of *C. orissa*: *b.c.* = brain case; *l.j.* = lower jaw; *u.j.* = upper jaw; *c.f.* = cephalic fin; *o.c.* = occipital condyle; *hm.* = hyomandibular; *n.c.* = nasal capsule; *e.* = sclerotic cartilage; *o.p.* = prolongation of the cartilage towards the eye (sheath for optic nerve); *sc.* = scapula; *co.* = coracoid; *j.* = junction of hyomandibular with the cranium: the branchial arches have been omitted; the cranium proper is shown in thick outline: *a* and *b* = denticles of the skin from above and from the side.
- „ 2.—Diagram, to scale, of the head of *C. orissa*; figures represent centimetres.
- „ 3.—Cranium of *Aëtobatis narinaria* showing well-defined orbits: *o.* = orbit; *e.* = eye; *c.f.* = cephalic fin.

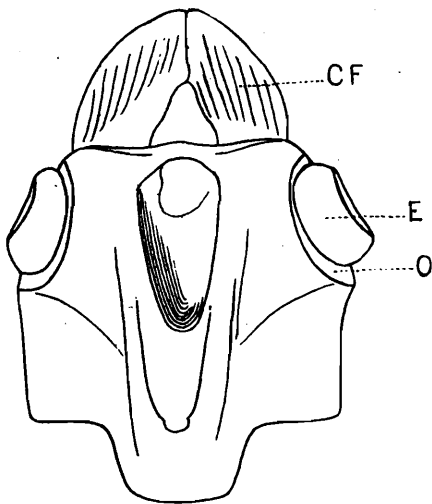


Fig. 3.

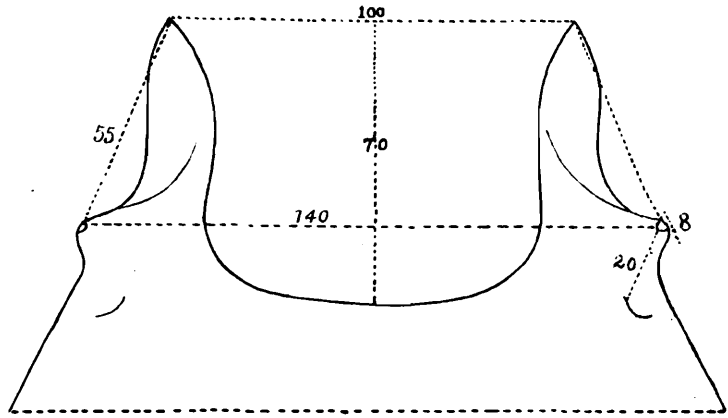


Fig. 2.

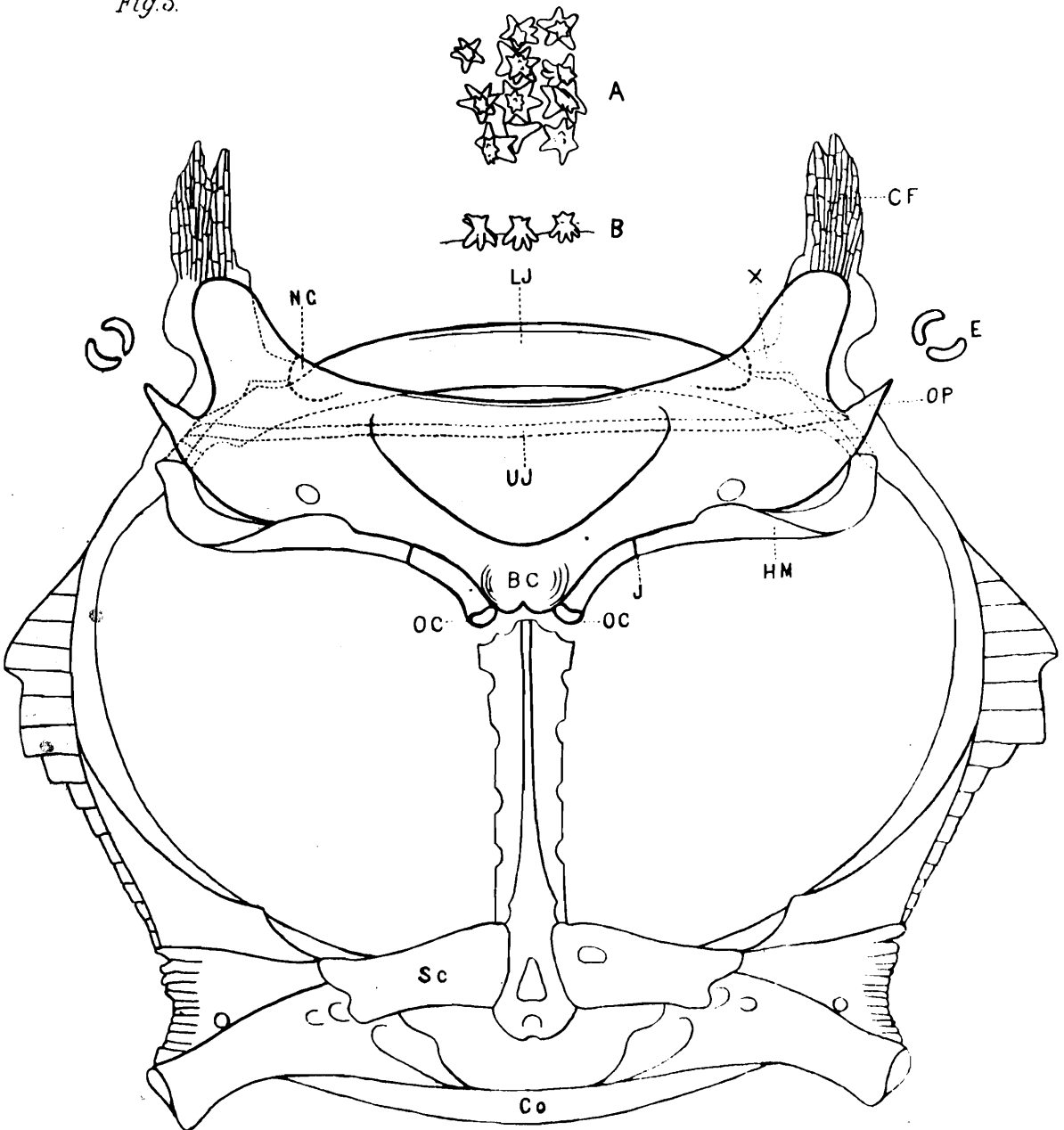


Fig. 1.

XXII.—DESCRIPTION OF A NEW SPECIES  
OF THE GENUS *SESARMA*, SAY., FROM  
THE ANDAMAN ISLANDS

By DR. J. G. DE MAN.

A collection received from Dr. Annandale of the Indian Museum, Calcutta, comprises a new species of the genus *Sesarma*, Say. It is represented by one male and two females that were collected at Mount Hamet, Port Blair, Andaman Island, in fresh-water streams in dense forest at a height of 700 feet, by Mr. B. B. Osmaston, in January, 1907. The larger of the two females, which are a little smaller than the male, carries a *Sacculina*.

*Sesarma thelxinoë*, sp. nov.

(Plate xi.)

A new species of the subgenus *Sesarma*, related to *Sesarma sylvicola*, de M., from Sumatra, to *S. ocyroda*, Nob., from Benkoelen and to *S. celebensis*, Schenkel, from Celebes.

Both in the male and in the female the distance between the outer orbital angles appears a little larger than the length of the carapace, the proportion being nearly as 13 : 12. Upper surface depressed, very slightly arcuate transversely at the level of the mesogastric area, whereas the gastric region slightly slopes down forward towards the frontal lobes; posteriorly the upper surface is more flattened, whereas the epibranchial regions are deflexed downward. Regions indicated, but incompletely defined. Of the cervical groove the transverse furrow that defines the gastric region posteriorly is well developed and rather deep only in its lateral parts; the mesogastric furrow is shallow, though reaching to just behind the middle of the gastric region. The protogastric areas that slope down laterally to the lower situated, hepatic region, are not separated at all from the anterior branchial areas, nor from the mesogastric area which is also undivided. The intestinal region is bounded laterally by shallow depressions.

The front, which is vertically deflexed, is just half as broad as the distance between the outer orbital angles. Of the four post-frontal lobes, which are separated from each other by narrow, moderately deep incisions, the inner are just *twice as broad* as the outer; the post-frontal lobes are prominent and hide the front, though the lower margin is visible when the carapace is looked at from above. The free edge of the post-frontal lobes is rather sharp, though very

finely granulated; that of the inner lobes is straight and transverse in the male and in the younger female (fig. 2), but in the other female the free edge of these lobes is slightly concave and runs a little obliquely (fig. 4). The outer post-frontal lobes reach a little further forward than the inner. The front (fig. 3), which is somewhat concave, is four times as broad as high; in the male, in which the upper margin is 6.8 mm. broad, the front is 1.7 mm. high at either side of the middle. The lateral margins of the front are nearly parallel, being only very slightly convergent; the lower margin is but very faintly sinuous, the median emargination is broad, but *very shallow*, and the lateral ones are hardly recognisable. Viewed from before, the lower margin appears straight in the middle; on each side of the middle it appears, in the male, very slightly concave, but in the two females distinctly so. The front is covered, especially laterally, with microscopical granules, but the anterior surface of the inner post-frontal lobes is almost smooth; lying on each side contiguous to the lower margin are two or three somewhat larger granules.

As in other species, a transverse ridge is situated a little behind the free margin of the outer post-frontal lobes; between this margin and the ridge, which is very finely granulate and presents a somewhat oblique direction, the upper surface of the outer frontal lobes is covered with some small granules, that anteriorly are partly arranged in transverse rows. Some small granules are also observed on the anterior half of the hepatic region and near the antero-lateral margins of the carapace, as also two short, finely granulated ridges, the anterior, shorter one on the extraorbital tooth, the other near the middle of the first epibranchial tooth. The deflexed, branchial regions are marked with the usual oblique striæ. All the rest of the upper surface of the carapace is *perfectly smooth, without any trace of granules*, even when examined through a magnifying glass; *the inner post-frontal lobes are thus also quite smooth above as far as their anterior margin*. The upper surface is, however, punctate, finely on the gastric region, more coarsely on the branchial regions and on the depressions that separate the latter from the area intestinalis; in a few puncta short, stiff setæ are inserted. As in *S. sylvicola*, the lateral margins of the carapace distinctly diverge backward and are very faintly concave behind the middle.

Extraorbital tooth acute, its outer margin slightly convex, sometimes straight or even faintly concave; by a rather deep, triangular notch this tooth is separated from the first epibranchial, which is also acute and, like the extraorbital tooth, somewhat turned upward; the outer margin of this tooth, which is once-and-a-half as long as the extraorbital tooth, is straight and already divergent. A trace of a very small second epibranchial tooth is indicated. The posterior margin of the carapace is just as broad as the front.

The abdomen of the male (fig. 5) resembles that of *S. sylvicola* (de Man, *Abhandl. Senckenberg. Naturf. Gesellschaft*, xxv, 1902,

pl. xix, fig. 11b); the obtuse, terminal joint is almost once-and-a-half as long as the penultimate, and the posterior margin of the latter is two-and-a-half times as broad as this joint is long. In the younger female the terminal segment is for one-third of its length impacted in the penultimate, in the other female not even as far.

Chelipedes equal, both in the male and in the female. Outer surface of the arm transversely wrinkled, neither the upper nor the inner border of the arm ends in a tooth or spine; but the inner border presents a slight, subterminal dilatation and appears finely, though irregularly, denticulate along its whole length; about thirty very small acute teeth, recognisable through a lens, occur on the lower border. Upper surface of the wrist covered, especially on its outer side, with finely crenulate ridges, inner angle obtuse—not dentiform; examined by means of a lens a few minute setæ are observed on the upper surface. In the male the horizontal length of the chelæ (fig. 6) measures three-fourths the distance between the outer orbital angles; the fingers are a little longer than the palm which is one-fourth higher than long. To the naked eye both palm and fingers appear smooth. Examined by means of a magnifying-glass the rounded upper border of the palm, which carries no pectinated crests, appears a little granular by very small granules; but for a few oblique striations near the carpal articulation, the convex outer surface of the palm appears *perfectly smooth*; the rounded lower margin is slightly granular, the granules being microscopical, though slightly larger and rather acute on the inner side and extending here to the middle of the immobile finger. The fingers are pointed; their convex, outer surface is smooth, though somewhat punctate; the tapering dactylus has neither ridges nor grooves, but is covered above *with minute subacute granules* that extend to near the tip and are rather *irregularly arranged*. The inner surface of the palm presents no trace of a transverse crest or ridge, but it carries a few, very small, subacute granules, visible by a lens, one or two of which near the upper border are a little larger than the rest. The immobile finger has two small, conical teeth, one contiguous to the horny tip, the other near the base, and between them are six or seven smaller teeth, while two or three occur near the base; the tothing of the dactylus is nearly the same.

The chelæ of the female are comparatively smaller, measuring three-fifths only of the distance between the outer orbital angles; but the fingers are comparatively longer than in the male. The oblique striæ near the carpal articulation are hardly developed and the upper border of the dactylus is nearly smooth; the granules on the inner surface of the palm are also fewer in number and smaller.

The ambulatory legs apparently closely resemble those of *S. sylvicola*. The meropodites, which have a subterminal, acute tooth on the anterior border, are slender like the other joints, and their outer surface is covered with short, transverse, crenulate lines, —that of the last pair excepted, these being nearly smooth; so,

*e.g.*, are the meropodites of the penultimate pair three times as long as broad. The carpal joints, which, like the following joints, are smooth, are furnished on their outer surface with two longitudinal ridges, less distinct on those of the last pair. The propodites are little more than three times as long as broad, and the dactyli are but little shorter than the penultimate joints; in the male, not in the female, the posterior margin of the dactyli is tomentose, as also the distal third part of that of the propodites. The ambulatory legs are fringed with stiff bristles which are black on their proximal and white on their distal half.

The carapace and ambulatory legs are red-brown, the chelipedes yellow.

<i>Measurements in millimetres.</i>		♂	♀	♀
Distance between the outer orbital angles		13.7	12.75	12.4
Length of carapace, measured in the middle line, abdomen excluded		12.75	11.6	11.5
Breadth of the upper margin of the front		6.8	6.5	6.4
Distance between the 1st epibranchial teeth			13	12.75
Greatest width of the carapace		14.4	13.75	13.5
Breadth of posterior margin of carapace ..		7	6.5	6.6
Length of the terminal joint of abdomen.		2.5		
,,    ,, penultimate joint		1.8		
Breadth of the anterior margin of this joint		2.7		
,,    ,,    ,, posterior    ,,    ,,    ,,		4.6		
Length of antepenultimate joint		1.52		
Horizontal length of chela		10.4	7.75	8
,,    ,,    ,, fingers		5.7	4	4.3
Height of the palm		5.5	3.8	4
Length of meropodite	} of penultimate pair of legs {	10.4	9	8.5
Breadth    ,,		3.2	3	3
Length of propodite in the middle		7	6	6
Breadth of    ,,    ,,		1.8	1.9	1.7
Length of dactylus		6.5	5.75	5.75

*Sesarma thelxinoë* differs at first sight from *S. ocy-poda*, Nob., its variety *gracillima*, de M., and *S. sylvicola*, de M., by the smoothness of the gastric region and of the upper surface of the inner post-frontal lobes, as also by the smoothness of the outer surface of the chelæ. There are, however, still more differences, for which I refer to my work in *Abhandl. Senckenb. Naturf. Gesellschaft*, xxv, 1902, pp. 522-527, pl. xix, figs. 9-11.

Of *S. aranea*, Nob., a young male specimen, from the Island of Nias, kindly presented to me by Dr. Nobili, is lying before me. The distance between the outer orbital angles is 6.3 mm., the length of carapace 6 mm., and the lateral margins slightly diverge posteriorly, so that, as regards the general shape of the carapace, both species agree with one another. The first epibranchial tooth is, however, shorter than the extraorbital tooth and less prominent laterally; the upper surface of the inner post-frontal lobes and

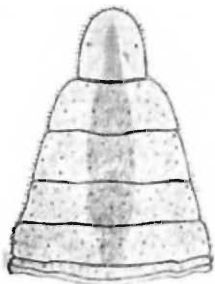
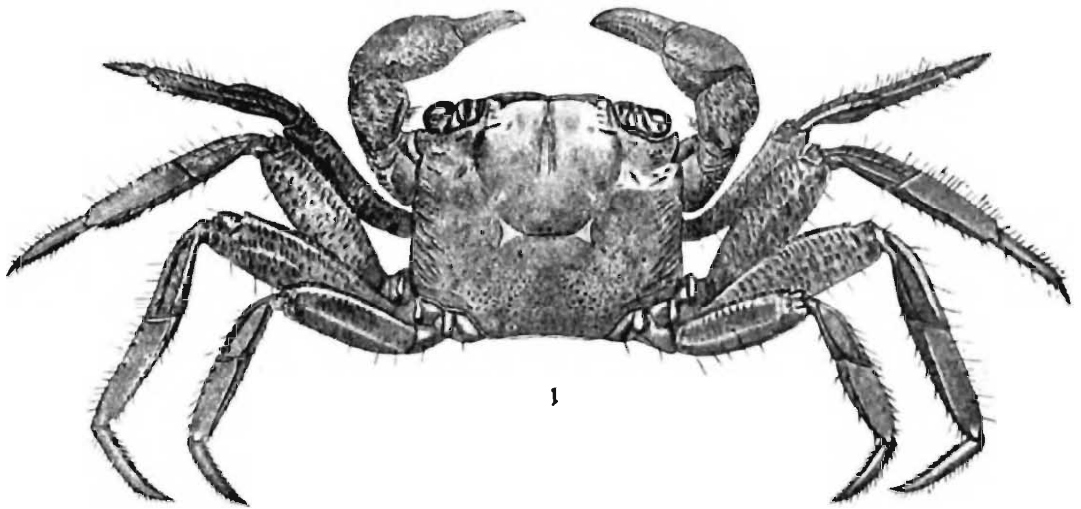
the anterior part of the protogastric areas are *distinctly rugose and granular*; the front is *higher*,—3 mm. broad, 1 mm. high; the chelæ are *granular* on their outer surface and the five or six acute teeth on the proximal half of the upper margin of the dactylus are *much larger* than in *S. thelxinoë*. The abdomen has a different shape, resembling that of *S. moeschii* (de Man in Max Weber's *Zoolog. Ergebn.*, 1892, tab. xx, fig. 14a); the penultimate segment, indeed, is *much less enlarged*, its posterior margin is 1.92 mm. broad, while this segment is 0.9 mm. and the antepenultimate 0.72 mm. long. Both species are therefore considered as different, but an examination of younger individuals of *S. thelxinoë* will be useful in order to see whether they show the same characters as the adult.

*Sesarma (Sesarma) amphinome*, de M., of which a female from Sintang, described in 1899, is lying before me, is a more different species.



EXPLANATION OF PLATE XI.

- FIG. 1.—*Sesarma thelxinoë*, sp. nov., male, × 2.  
,, 2.—Front of the same specimen viewed from above, × 3.  
,, 3.— „ „ „ „ „ „ before, × 3.  
,, 4.—Anterior half of the upper surface of the larger female, × 3.  
,, 5.—Abdomen of the male, × 3.  
,, 6.—Chela of the male, × 3.



J.G. de Man. del., Dec. 1907.

*SESARMA (SESARMA) THELXINOE*, De MAN.

XXIII.—DESCRIPTIONS OF NEW SPECIES  
OF LAND, MARINE AND FRESHWATER  
SHELLS FROM THE ANDAMAN  
ISLANDS

By H. B. PRESTON, F.Z.S.

The species described in the present paper formed part of the collection of the late Rev. J. Warneford who was, for many years, Chaplain to His Majesty's Forces in the Andaman Islands, and an ardent and indefatigable collector; the collection took twelve years to amass, and is perhaps the largest ever got together on those Islands. The "types" have recently been acquired by the Trustees of the Indian Museum, in whose collection they now are.

*Sitala denselirata*, sp. nov.

Shell perforate, conical, carinate at the periphery, opaque, pale yellowish horn colour; whorls  $6\frac{1}{2}$ , rather convex, sculptured with fine spiral liræ; base of shell somewhat convex, spirally striate; columella straight, reflexed over the very narrow umbilicus, peristome acute; aperture sub-quadrate.

Altitude	6	mm.
Diam., major	6.25	,,
Aperture, alt.	2.25	,,
diam.	3	,,
Habitat—Andaman Islands.		

Approaching *S. attega*, Benson<sup>1</sup> (= *cadelli*, Nev. MS.). The spire is, however, less acuminate and in general shape the shell is much narrower in proportion to its height; the carination is also not so marked and the spiral sculpture is coarser than in *S. attega*.

*Tornatina conspicua*, sp. nov.

Shell imperforate, regularly cylindrical, white, shining, covered with a rich reddish brown periostracum; spire somewhat exerted; whorls 6, the last sculptured with fine, wavy spiral striæ; sutures deeply and broadly channelled; aperture narrow, scarcely dilated below, a thickening of the shell appearing about half a millimetre from the edge of the peristome; peristome slightly inflated in the middle, acute; columella arched, terminating in a basal fold, a callus extending from it to the suture.

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<sup>1</sup> *Ann. Mag. Nat. Hist.* (3), iii, p. 184, 1859.

Altitude	10.5 mm.
Diam., major	4.5 „
Aperture, alt.	9 „
„ diam., minor	7.5 „
Habitat—Off Port Blair, Andaman Islands,	7—10 fathoms.

*Atys convexa*, sp. nov.

Shell umbilicate, tumid, ovate, constricted at the ends, pale lemon colour, with two irregular narrow greenish bands especially noticeable on the ventral surface, smooth, polished except at the ends where it is spirally grooved; apex closed; aperture narrow above, broadening below; columella descending obliquely, curved outwards, produced; peristome simple, rising high above the vertex.

Altitude	3.25 mm.
Diam.	2 „
Habitat—Off Port Blair, Andaman Islands,	7—10 fathoms.

*Atys neglecta*, sp. nov.

Shell imperforate, elongately ovate, sub-cylindrical, rather convex in the middle, greyish white, polished, smooth except at the ends where several grooves appear; apex closed; aperture very narrow above, moderately wide below; columella oblique; peristome broadly thickened, bent slightly inwards, a little extended above the vertex.

Altitude	4 mm.
Diam., major	2 „
Habitat—Off Port Blair, Andaman Islands,	7—10 fathoms.

*Atys pacei*, sp. nov.

Shell straight, cylindrical, semi-transparent white, sculptured throughout with fine spiral striæ, becoming more numerous and closely set towards the base; apex very narrowly perforate; aperture narrow above, dilated below; columella obliquely arched; peristome simple, rising above the vertex.

Altitude	11 mm.
Diam., major	5 „
Habitat—Off Port Blair, Andaman Islands,	7—10 fathoms.

*Atys vixumbilicata*, sp. nov.

Shell ovate, narrowly perforate, pale yellowish horn colour, very finely spirally striate and rather coarsely grooved towards the ends; apex closed; aperture narrow above, broadening below;

columella descending obliquely ; peristome thickened, produced above the vertex.

Altitude	:	3.5 mm.
Diam.		2 ,,
Habitat—	Off Port Blair, Andaman Islands,	7—10 fathoms.

*Haminea callosa*, sp. nov.

Shell ovate oblong, very narrowly perforate, yellowish horn colour, thin, vitreous, marked with oblique transverse lines of growth ; peristome simple ; aperture narrow, posteriorly elevated, not greatly expanded anteriorly ; columella twisted at base, a callus joining it with the lip above.

Altitude		15 mm.
Diam., major		9.25 ,,
Aperture : diam., min.		1 ,,
Habitat—	Off Port Blair, Andaman Islands,	7—10 fathoms.

*Terebra carnicolor*, sp. nov.

Shell subulate, pale flesh colour, polished, shining ; remaining whorls 15, sculptured with closely set longitudinal costæ, crossed near the upper end by a slight spiral groove, thus forming an infra-sutural crenate band ; the interstices between the costæ spirally punctate, the punctations of the upper row being coarser than the rest ; aperture small, narrow ; columella descending rather obliquely ; peristome simple ; base of shell marked with three revolving punctate grooves.

Altitude		22 mm.
Diam., major		4 ,,
Aperture, alt.		3 ,,
,, diam.		1.25 ,,
Habitat—	Andaman Islands.	

*Terebra rubrobrunnea*, sp. nov.

Shell narrowly subulate, reddish brown ; remaining whorls 21, very flat, sculptured with oblique, rather closely set transverse costæ interrupted by spiral striæ and two crenate sutural bands, the upper of which is much the broader ; sutures scarcely impressed ; columella descending in a curve, extending into a thick, projecting callus which joins the lip above ; peristome sinuous, slightly reflexed ; aperture narrowly ovate ; canal short, re-curved.

Altitude		47 mm.
Diam., major		6 ,,
Aperture, alt.		6 ,,
,, diam..		2 ,,
Habitat—	Andaman Islands.	

Allied to *T fenestrata*, Hinds<sup>1</sup>; the transverse costæ in the present species are, however, closer together and not so coarse, the spiral striæ are also more numerous and not so well defined.

*Terebra unicolor*, sp. nov.

Shell rather bluntly, elongately subulate, pale brownish orange throughout; remaining whorls 17, sculptured with a coarse infra-sutural spiral crenate rib and five smaller spiral crenate ribs, the interstices finely punctate; aperture small; columella recurved, twisted; canal short.

Altitude	44 mm.
Diam., major	7.25 ,,
Aperture, alt.	6 ,,
„ diam.	2.5 ,,
Habitat—Andaman Islands.	

Allied to *T albomarginata*, Desh., of which species I was at first inclined to consider it a variety, but its much blunter form, lack of white edging to the whorls, coarser ribbing and finer punctation lead me to think that it is specifically distinct.

*Conus edwardi*, sp. nov.

Shell turbinata, coronate, white, the upper whorls tessellated with reddish brown; the body whorl painted with four irregular bands of bright reddish brown, the first much interrupted, the intervening spaces streaked, tessellated and very indistinctly lined with the same colour, faintly and regularly spirally striate; spire bluntly exerted; interior of shell whitish, except at the base where the reddish brown colouring is again apparent.

Altitude	58 mm.
Diam., major	28 ,,
Aperture, alt.	49.5 ,,
„ diam., minor	3 ,,
Habitat—Andaman Islands.	

Allied to *Conus zonatus*, Hwass; it is, however, narrower and less pyriform in shape, the spire is more exerted and the beautiful reddish brown colouring readily distinguishes it from that well-known species, in which the bands are purplish gray, and which is so conspicuously lined with orange.

*Pleurotoma rimata*, sp. nov.

Shell turreted, yellowish brown; whorls 11, the upper bearing two spiral ridges between which is a row of coarse tubercles, the intervening spaces sculptured with minute spiral and transverse striæ, the last whorl bearing five spiral liræ in addition to the

<sup>1</sup> *Proc. Zool. Soc. London*, 1843, p. 153

row of tubercles between the first two of these ; base of shell coarsely spirally lirated ; aperture oval ; peristome reflexed, especially round the sinus ; sinus broad and rather deep ; columella lip expanded, erect, forming an umbilical fissure between it and the base of the shell ; canal rather long, slightly reflexed upwards at base.

Altitude	25.5 mm.
Diam., major	10 „
Aperture, alt.	5.5 „
„ diam.	3 „
Habitat—Andaman Islands.	

Allied to *Pleurotoma acutigemmata*, Smith, which has also been recorded from the Andamans<sup>1</sup> ; it is, however, broader at the periphery, more sharply turreted, and possesses a much longer canal ; the reflexed peristome in the region of the sinus and the expansion of the columella also easily distinguish it from that species.

*Drillia fraga*, sp. nov.

Shell elongately fusiform, deep reddish brown ; remaining whorls 7, rather flat, sculptured with regular closely set rows of small white tubercles and bearing a single infra-sutural row of coarser tubercles between which and the remaining smaller rows there is a broad but shallow groove ; sutures impressed ; aperture obliquely ovate ; canal short.

Altitude	22 mm.
Diam., major	8 „
Habitat—Andaman Islands.	

In many respects resembling *Drillia digitalis*, Reeve, from the Philippines ; it is, however, separable from that species by its more acutely fusiform shape and flatter whorls ; the rows of tubercles are also placed further apart and at more regular intervals.

*Drillia sikesi*, sp. nov.

Shell solid, imperforate, acuminate fusiform, chalky white, painted with a broad, pale brown, infra-peripheral band ; whorls 10, the upper much eroded, the lower bearing a row of coarse tubercles at the periphery ; columella descending abruptly, solid, white ; sinus broad ; peristome thin and irregularly serrated ; aperture oval ; interior of shell white.

Altitude	31 mm.
Diam., major	14 „
Aperture, alt.	12 „
„ diam.	4 „
Habitat—Andaman Islands.	

<sup>1</sup> Melvill and Sykes, *Proc. Malac. Soc. London*, vol. ii, p. 165.

Closely allied to *D. exasperata*, Reeve of which species the locality is unknown; it is, however, larger and more graceful in form, the aperture is narrower in proportion to the general size of the shell, and it does not show the transverse, infra-peripheral ribbing on the last whorl which is very conspicuous in the type of *D. exasperata*.

*Mangilia andamanensis*, sp. nov.

Shell slenderly fusiform, pale yellowish brown, blotched here and there with light chestnut; whorls 7, convex, angled above, the first two horny, the later whorls sculptured with transverse ridges and fine spiral striæ, presenting a finely cancellate appearance; sutures deeply impressed; aperture oval; outer lip varicosely thickened; sinus broad but not deep.

Altitude	6	mm.
Diam., major	2	,,
Aperture, alt.	2	,,
,, diam.	·75	,,
Habitat—Andaman Islands.		

*Mangilia exasperata*, sp. nov.

Shell fusiform, pale brown, narrowly banded with a deeper shade of the same colour; whorls 9, angular, convex, the first two smooth, horny, polished, the remaining seven sculptured with coarse, transverse, varicose ridges, crossed by spiral liræ between which appear numerous fine striæ; sutures impressed; aperture elongate; outer lip varicosely thickened.

Altitude	..	16·25	mm.
Diam., major.		5·5	,,
Habitat—Andaman Islands.			

*Mangilia obtusa*, sp. nov.

Shell obtusely fusiform, pale yellowish white, painted on the upper whorls with two thin bands of rich brown, which increase on the last whorl to two sets of stripes of the same colour, the upper set consisting of four stripes, the lower of seven; remaining whorls  $5\frac{1}{2}$ , rather flat, closely cancellate; aperture ovate; peristome varicosely thickened; sinus broad and shallow.

Altitude	6·5	mm.
Diam., major	2·25	,,
Aperture, alt.	2·5	,,
,, diam.	·75	,,
Habitat—Andaman Islands.		

*Clathurella malleti*, Récl., var. *nivea*, var. nov.

Agrees in shape and sculpture with the typical form, the opaque white median band being still somewhat prominently visible

on the body-whorl; the remainder of the shell is, however, semi-transparent white throughout.

Habitat—Andaman Islands.

The typical form also occurs in the present collection, and it appears to have been also noticed by Nevill from these Islands.

*Clathurella selli*, sp. nov.

Shell fusiform, greyish white with a continuous dark, blackish brown band at the base of the body-whorl and a much broken infra-sutural band of the same colour; whorls 7, transversely, varicosely costate and spirally ridged, presenting a coarsely cancellate appearance, the basal, spiral ridge being especially developed; sutures impressed; aperture narrow; columella descending somewhat obliquely; peristome varicosely thickened.

Altitude	4.5 mm.
Diam., major	1.75 ,,
Aperture, alt.	1 ,,
,, diam.	.5 ,,
Habitat—Andaman Islands,	7—10 fathoms.

*Mitra emiliae*, sp. nov.

Shell elongately fusiform, pale reddish brown, painted with an indistinct cream-coloured infra-sutural band; whorls 9, the first six spirally grooved, the remaining three faintly striate; sutures well impressed; aperture elongately oval; peristome continuous and slightly reflexed; columella four-plaited, the two first plaits very strong.

Altitude	19 mm.
Diam., major	6 ,,
Aperture, alt.	8.5 ,,
,, diam.	1.75 ,,
Habitat—Andaman Islands.	

This species in some respects recalls *M. ebenus* from the Mediterranean; it is, however, paler in colour; the body-whorl is broader in proportion to the size of the shell, the peristome is continuous and the apical whorls are spirally grooved and not transversely striated and punctured as is the case with *M. ebenus*.

*Mitra warnefordiana*, sp. nov.

Shell ovately oblong, spire rather blunt, dark brown, painted with a thin, yellowish line just above the sutures and on the body-whorl at about one-fourth its height from the suture; remaining whorls 7, somewhat shouldered, spirally striate and transversely ribbed above, giving the shell a cancellate appearance, the ribs becoming obsolete on the lower portion of the body-whorl. Sutures impressed; aperture elongate; peristome slightly thickened, but

not reflexed; columella bearing three plaits, the first strong and nacreous white.

Altitude	25 mm.
Diam., major	9 ,,
Aperture, alt.	13 ,,
,, diam.	: 2'5 ,,
Habitat—Andaman Islands.	

Related to *M cruentata*, Reeve, but is more cylindrical in general outline, is much more finely sculptured and lacks the yellow markings on the ribs; the aperture is also more elongate than in that species.

*Nassa gerstenbrandti*, sp. nov.

Shell ovately fusiform, yellowish white, narrowly banded at the sutures; periphery and base with reddish chestnut; whorls  $6\frac{1}{2}$ ; the apical whorl smooth, polished, the remainder finely, spirally striate and sculptured with somewhat distant, varicose ribs; sutures impressed; aperture inversely auriform; columella descending obliquely, extending into a callus which reaches the lip above; peristome varicosely thickened, finely denticulate within; canal short.

Altitude	4'75 mm.
Diam., major	2'25 ,,
Aperture, alt.	1'5 ,,
,, diam.	'75 ,,
Habitat—Andaman Islands, 7—10 fathoms.	

*Nassa jucunda*, sp. nov.

Shell fusiform, pale yellow, painted with an infra-sutural band of rich chestnut and a paler peripheral band of reddish brown; whorls 5, rather flat, sculptured with closely set transverse costæ and fine spiral striæ; sutures impressed; columella tridenticulate; aperture oval; peristome thickened, denticulate within.

Altitude	5 mm.
Diam., major	2'25 ,,
Aperture, alt.	1'5 ,,
,, diam.	'5 ,,
Habitat—Andaman Islands, 7—10 fathoms.	

Easily distinguished from *N. gerstenbrandti* by the finer sculpture, flatter whorls and more pronounced colouring.

*Nassa tristis*, sp. nov.

Shell fusiform, dull greyish olive with a pale infra-sutural band; whorls 8, transversely, coarsely ribbed and finely, spirally lirate; sutures impressed; peristome varicosely thickened, bearing a row of denticles just within the aperture of which the posterior one is the coarsest; aperture ovate; columella broadening into a

thick callus which reaches the lip above and bearing a bifurcated fold or plait below and an obliquely transverse plait above.

Altitude	10 mm.
Diam., major	4.25 ,,
Aperture, alt.	3 ,,
,,    diam.	1.75 ,,
Habitat—Andaman Islands.	

*Columbella suavis*, sp. nov.

Shell elongately fusiform, polished, white, broadly banded with brownish yellow and painted with occasional blotches of a deeper colour; whorls  $9\frac{1}{2}$ , scarcely convex, sculptured with closely set, transverse ribs and very fine wavy spiral striæ; base of shell spirally sulcate; columella stained with pale violet, slightly reflexed, descending somewhat obliquely; peristome broadly, varicosely thickened, dentate within; aperture elongate; canal long, narrow, scarcely recurved.

Altitude	9.75 mm.
Diam., major	5.5 ,,
Aperture, alt.	4 ,,
,,    diam.	1.50 ,,
Habitat—Andaman Islands.	

*Gyrineum wilmeriana*, sp. nov.

Shell acuminate ovate, yellowish white, bearing traces of having been covered with a thin hirsute periostracum; whorls 8, transversely striate and spirally lirate, bearing at intervals interrupted tubercular ribs of a dark chestnut colour; varices interruptedly painted with dark chestnut; columella extending into a rough callus which joins the lip above; peristome varicosely thickened, bearing a row of denticles within; aperture roundly ovate; canal short, recurved; operculum horny, multi-spiral, roughly laminiferous.

Altitude	..	28.5 mm.
Diam., major		20.5 ,,
Aperture, alt.		8 ,,
,,    diam.		5 ,,
Habitat—Andaman Islands.		

I have much pleasure in dedicating this species to Colonel L. W. Wilmer, to whose many years' collecting in the Andaman Islands a number of interesting forms are attributable.

*Vertagus kochi*, Phil., var. *polita*, var. nov.

Much shorter, thinner, more polished and more lightly sculptured than the typical form. In colour it varies from pale yellowish grey or straw colour to dark reddish chestnut.

Altitude	23 mm.
Diam., major	6.5 ,,
Habitat—Andaman Islands.	

Mr. Warneford collected a large series of this shell, and as, with the exception of colour, there is no variation in size or texture, it would seem to be a well-marked local race and possibly even a distinct species.

*Melania charon*, sp. nov.

Shell elongately subulate, dark brownish black; remaining whorls 12, convex, marked throughout with lines of growth and spirally sculptured with faint, somewhat distant raised striæ; sutures well impressed; columella descending in a rounded curve and extending into a slight callus which reaches the lip above; peristome simple; aperture oblong ovate; interior slate colour.

Altitude	56 mm.
Diam., major	12 ,,
Aperture, alt.	11.75 ,,
,, diam.	7 ,,
Habitat—Andaman Islands.	

*Melania expatriata*, sp. nov.

Shell subulately turreted, dark blackish brown; remaining whorls  $4\frac{1}{2}$ , spirally striated on the lower half of the upper whorls; the body-whorl encircled by an infra-sutural ridge forming a distinct shoulder and weakly spirally lirate throughout below the ridge; sutures impressed; peristome simple; columella arched, a callus joining it with the lip above; aperture inversely auriform.

Altitude	33.25 mm.
Diam., major	12.25 ,,
Aperture, alt.	10.5 ,,
,, diam.	5.5 ,,
Habitat—Andaman Islands.	

The shoulder formed by the infra-sutural ridge presents a somewhat striking appearance and recalls some of the Western Pacific Island forms in which this character occurs; the other characters, however, when taken collectively or singly, easily separate it from any of the species described from those regions.

*Melania multistriata*, sp. nov.

Shell decollate, subulate, dark olive brown; remaining whorls 4, rather flat, sculptured throughout with fine transverse striæ and coarser spiral striæ; sutures deep and incised; columella arched; peristome acute; aperture ovate; interior bluish grey.

Altitude	26	mm.
Diam., major	10	„
Aperture, alt.	9.5	„
„ diam.	4	„
Habitat—Andaman Islands.		

*Risella balteata*, sp. nov.

Shell conical, narrowly and deeply perforate, sharply carinate and slightly undulately waved at periphery, pale yellow with a broad pinkish yellow median band; whorls 4, somewhat convex, spirally striate; sutures impressed; base of shell flattened, spirally grooved and transversely striate; aperture obliquely subquadrate.

Altitude	1.75	mm.
Diam., major	3	„
Aperture, alt.	1.25	„
„ diam.	.75	„
Habitat—Andaman Islands.		

The above species may be compared with *Risella lutea*, Gld.; it is, however, much smaller, less undulately waved at the periphery and less coarsely striate on the upper whorls.

*Alaba warnefordiana*, sp. nov.

Shell turritiform, yellowish white; whorls 7—8, flat above, but slightly bulging over the sutures, spirally striate and indistinctly varicosely costulate; sutures impressed; aperture oval; peristome simple.

Altitude	4.5	mm.
Diam., major	1.5	„
Aperture, alt.	1	„
„ diam.	.5	„
Habitat—Andaman Islands.		

Allied to *A. blanfordi*, A. Ad., but has larger and fewer varices on the upper whorls; the spiral sculpture is also coarser than is the case with *A. blanfordi*.

*Rissoina angusta*, sp. nov.

Shell narrowly fusiform, solid, yellowish white; whorls 9, the first three smooth, the remainder transversely, obliquely ribbed; sutures impressed; aperture ovate; peristome somewhat sinuous.

Altitude	4.5	mm.
Diam., major	1.5	„
Habitat—Off Port Blair, Andaman Islands, 7—10 fathoms.		

*Rissoina cylindrica*, sp. nov.

Shell somewhat cylindrical, white with a brownish infra-sutural band; covered with a dull chocolate-coloured periostracum; remaining whorls 5, rather flat, sculptured with fine, transverse costæ and minute, spiral striæ, presenting a punctate appearance between the former; sutures impressed; aperture ovate; outer lip broadly thickened and somewhat expanded, a well-developed callosity joining the columella with the lip above.

Altitude	5.5 mm.
Diam., major	2 „
Aperture, alt.	2 „
„ diam.	1 „
Habitat—Andaman Islands.	

*Rissoina læta*, sp. nov.

Shell elongately fusiform, dull white; whorls  $7\frac{1}{2}$ , the first  $5\frac{1}{2}$  very convex, the remaining 2 rather flat, sculptured throughout with fine, spiral striæ and oblique costæ, the latter becoming finer and almost obsolete on the last two whorls; columella descending rather obliquely and extending into a callus above; peristome varicosely thickened; aperture ovate.

Altitude	6.5 mm.
Diam., major	2.25 „
Aperture, alt.	2 „
„ diam.	1 „
Habitat—Andaman Islands.	

*Rissoina pupiniiformis*, sp. nov.

Shell fusiform, somewhat flattened, semi-transparent white, polished; whorls 6, scarcely convex, encircled by a super-sutural spiral groove; sutures scarcely impressed; aperture oval; columella slightly arched; peristome simple, bearing one small basal denticle.

Altitude	6 mm.
Diam., major	3 „
„ minor	2 „
Aperture, alt.	1.75 „
„ diam.	1 „
Habitat—Andaman Islands.	

*Rissoina sculpturata*, sp. nov.

Shell decollate, fusiform, solid, whitish; remaining whorls  $4\frac{1}{2}$ , very flat, sculptured with transverse ribs interrupted by spiral ridges presenting a coarsely cancellate appearance; sutures scarcely defined; aperture ovate, oblique; peristome varicosely thickened; columella descending obliquely and extending into a callus which joins the lip above.

Altitude	45 mm.
Diam., major	2.25 ,,
Aperture, alt.	1 ,,
,, diam.	.5 ,,
Habitat—Off Port Blair, Andaman Islands,	7—10 fathoms.

*Rissoina warnefordiæ*, sp. nov.

Shell small, fusiform, yellowish white; whorls  $7\frac{1}{2}$ , rather convex, the first two smooth, shining, the remainder transversely ribbed and finely, spirally ridged, presenting a coarsely punctate appearance between the ribs; sutures impressed; aperture obliquely ovate; peristome simple; columella descending rather obliquely.

Altitude	3.5 mm.
Diam., major	1.25 ,,
Habitat—Off Port Blair, Andaman Islands,	7—10 fathoms.

*Narica depressa*, sp. nov.

Shell depressed, white, solid; whorls 3, sculptured with closely set, oblique, arcuate costæ, crossed by fine liræ, presenting a cancellate appearance; umbilical area smooth; umbilicus wide and deep; aperture oval; peristome continuous, simple, except in the umbilical region where it is slightly reflexed.

Altitude	7.5 mm.
Diam., major	17 ,,
Aperture, alt.	11.5 ,,
,, diam.	8 ,,
Habitat—Andaman Islands.	

*Eulima balteata*, sp. nov.

Shell acuminate pyramidal, solid, slightly distorted by curved, polished, greyish white, bearing a broad band of pure white above the sutures and at the periphery of the body-whorl; whorls 15; sutures scarcely impressed; aperture obliquely lunate; a callosity extending from the columella to the lip above.

Altitude	6.75 mm.
Diam., major	1.75 ,,
Aperture, alt.	1.5 ,,
,, diam.	5 ,,
Habitat—Andaman Islands.	

*Styloptygma andamanensis*, sp. nov.

Shell subulate, greyish white, painted with an indistinct whitish, infra-sutural, spiral band, semi-transparent; whorls 10, marked

with transverse lines of growth; sutures impressed; aperture elongately oval; columella posteriorly plicate.

Altitude	6.75 mm.
Diam., major	1.75 "
Habitat—Andaman Islands.	

In some measure resembling *Odostomia aciculina*, Souv.; it is, however, broader and the whorls increase more rapidly; it is also more transparent than that species, and, with the exception of the indistinct, whitish spiral band, the shell is devoid of painting.

*Menestho acuminata*, sp. nov.

Shell acutely turriform, yellowish white; whorls 7, flat, regularly spirally striate; sutures scarcely impressed; aperture sub-quadrate; peristome simple.

Altitude	5 mm.
Diam., major	2 "
Aperture, alt.	1.5 "
,, diam.	1 "
Habitat—North Bay, Andaman Islands.	

*Turbonilla foveolata*, sp. nov.

Shell acutely, elongately, turriform, upper portion curved, distorted; pure white; remaining whorls  $17\frac{1}{2}$ , flattish; the first eight increasing very slowly, sculptured with closely set transverse ribs and spiral striæ; base of shell spirally striate only; sutures well impressed; aperture sub-quadrate; peristome simple; columella sub-tortuous.

Altitude	14 mm.
Diam., major	3 "
Aperture, alt.	2 "
,, diam.	1 "
Habitat—Andaman Islands.	

*Leptothyra solida*, sp. nov.

Shell globosely turbonate, very solid, narrowly perforate, rather flat at the apex, yellowish white, transversely streaked with small blotches of reddish brown; whorls  $3\frac{1}{2}$ , spirally lirate throughout; sutures impressed; peristome simple; aperture sub-circular; operculum shelly, slightly concave, pauci-spiral with a central nucleus.

Altitude	2.5 mm
Diam., major	3 "
Aperture, alt.	1.25 "
,, diam.	1 "
Habitat—Off Port Blair, Andaman Islands, 7—10 fathoms.	

*Gibbula athena*, sp. nov.

Shell turbinately conical, angled at the periphery, dark bronze colour, painted with oblique, transverse, thin, yellowish white lines, a row of cream-coloured spots encircling the umbilical area; whorls 4, finely, spirally striate above; base of shell bearing several spiral liræ which are crossed by fine, transverse striæ; sutures impressed; umbilicus deep and fairly wide; columella arched; peristome simple; aperture sub-ovate; operculum horny, multi-spiral, with a central nucleus.

Altitude	..	4.5 mm.
Diam., major		3.5 ,,
Aperture, alt.		2 ,,
,, diam.		1.5 ,,
Habitat—Off Port Blair,	Andaman Islands,	7—10 fathoms.

Allied to *G. phædra*, Melvill, from the Mekran Coast; the spire is, however, more obtuse and the sculpture coarser below and finer above; the whorls are also more convex than is the case in *G. phædra*.

*Gibbula cæni*, sp. nov.

Shell perforate, turbinately conical, yellowish grey; whorls 5, shouldered above, flattish below, sculptured with coarse spiral liræ crossed by transverse striæ, presenting a cancellate appearance; sutures not very well defined; umbilicus rather broad, deep; aperture sub-circular; edge of peristome acute, a thickening appearing just within the aperture.

Altitude		3.50 mm.
Diam., major		3.25 ,,
Aperture, alt.		1.25 ,,
,, diam.		1 ,,
Habitat—Off Port Blair,	Andaman Islands,	7—10 fathoms.

*Margarita ponsonbyi*, sp. nov.

Shell small, globosely depressed, pale greenish, iridescent, white, painted with oblique, interrupted bands of dark green; whorls 4, very finely, spirally striate, and transversely marked with lines of growth; sutures impressed; umbilicus narrow, partly concealed by the projection of the columella; columella arched; peristome acute; aperture almost circular.

Altitude		3.5 mm.
Diam., major		4.25 ,,
Aperture, alt.		2.25 ,,
,, diam.		2 ,,
Habitat—Off Port Blair,	Andaman Islands,	7—10 fathoms.

An extremely beautiful little species and easily distinguished from any other member of the group. Just inside the aperture appear two shelly ridges, probably the remains of the outer lip at past rest periods.

*Solariella dulcissima*, sp. nov.

Shell depressedly conoid, somewhat obtusely keeled, white, painted above with large blotches of crimson, narrow radiating bands of the white ground colour appearing at irregular intervals between these; base of shell painted with rows of dark crimson dashes and flecked with spots and blotches of a lighter shade of the same colour between the rows and towards the periphery; whorls  $4\frac{1}{2}$ , sculptured throughout with very fine, spiral liræ crossed by minute transverse striæ giving a finely granular appearance to the shell; sutures impressed; umbilicus moderately wide, bordered by two coarse whitish ribs, the lower and coarser of which is nodulous; aperture roundly ovate; peristome simple; interior of shell iridescent, spirally striate.

Altitude	4	mm.
Diam., major	6.75	„
Aperture, alt.	3	„
„ diam.	2.75	„

Habitat—Off Port Blair, Andaman Islands, 7—10 fathoms.

A comparison may be made between this species and *S. variabilis*, A. Ad.; it is, however, thinner in texture, flatter and more keeled at the periphery; the umbilicus is also narrower and the general sculpture is much finer than in *S. variabilis*.

*Stomatella crenulata*, sp. nov.

Shell roundly auriform, somewhat depressed, pale pinkish yellow, mottled with oblique streaks and blotches of crimson fading to red and green; whorls 5, sculptured with light spiral ridges; the interstices marked with fine, wavy, spiral striæ except on the base of the shell where these last are absent, both crossed with transverse striæ presenting a slightly beaded or granular appearance; sutures crenulate above, incised below; columella descending obliquely in a rounded curve; umbilical region surrounded by a broad white callus; peristome acute; interior of shell highly iridescent.

Altitude	12	mm.
Diam., major	19.75	„
„ minor	15.25	„
Aperture, alt.	10	„
„ diam.	11.5	„

Habitat—Andaman Islands.

*Macroschisma elegans*, sp. nov.

Shell oblong, yellowish white, rayed and blotched with rose colour, cancellated with concentric and transverse striæ, the latter becoming much coarser anteriorly; fissure straight below, narrowing towards the apex, a wide, shallow, white channel leading from it to the posterior margin; peristome acute anteriorly, thick posteriorly and laterally.

Altitude	2·25 mm.
Diam., major	10 „
„ min.	4·25 „
Habitat—Andaman Islands.	

*Lucapinella gaylordæ*, sp. nov.

Shell oblong ovate, laterally contracted, posteriorly somewhat dilated, greenish white, irregularly rayed with blackish brown, roughly sculptured with scaly radiate ribs and concentric grooves; fissure ovate, contracted near both ends; peristome laterally blunt, acute at the ends; interior of shell white; callus-rim of fissure thick, crenulate.

Diam., major	10·75 mm.
„ minor	5·25 „
Altitude	3 „
Habitat—Andaman Islands.	

*Acmaea semicornea*, sp. nov.

Shell semicorneous, depressedly conical, irregularly subquadrate, pale yellowish brown, sculptured with fine radiating transverse ribs crossed by concentric striæ, presenting a very finely cancellate appearance; edge of peristome finely crenulate; apex simple, placed slightly to one side; anterior end of shell shortened; posterior end broadly produced.

Altitude	2 mm.
Diam., major	9 „
„ minor	7·75 „
Habitat—Andaman Islands.	

Allied to *Sutura fluviatilis*, Blanf.,<sup>1</sup> from the delta of the Irrawady river; the apex of the present species is, however, less central, the sculpture is much finer and more cancellate, the general texture is also more horny and the peristome is crenulate, which does not appear to be the case in *S. fluviatilis*.

Of three young specimens of this species in the British Museum labelled "Andaman Islands," and presented by Colonel L. Worthington Wilmer, one bears traces of being rayed with rusty brown, a

<sup>1</sup> *Journ. Asiat. Soc. Bengal*, xxxvi, pt. 2, 1867; p. 62; pl. ii, figs. 2—4.

character which is quite absent in the remaining two and in those in the Warneford collection. There is also a note attached to the British Museum specimens stating that they were found attached to *Mytilus*, but there is no means of ascertaining how Mr. Warneford's specimens were actually obtained.

*Chlamys andamanicus*, sp. nov.

Shell ovate, nearly equilateral, bright orange colour throughout, streaked and flecked especially on the upper part of the shell with white, both valves bearing about 60 fine, closely set, scaly riblets; auriculæ small, very unequal, the anterior large, curved below, the posterior sloping obliquely, both sculptured with scaly riblets.

Long. 16.5 mm.  
 Lat. 13.75 „  
 Habitat—Andaman Islands.

*Modiola cymbula*, sp. nov.

Shell elongately trapezoidal, pale yellowish brown, except at posterior end of ventral surface where it is of a pale reddish chestnut colour, concentrically striate with lines of growth, the posterior ventral surface longitudinally wrinkled; anterior lateral margin almost straight; posterior lateral margin sloped; ventral margin contracted towards the middle; umboes small, purple; interior of shell pale flesh colour, rapidly deepening to purple and blackish purple towards the dorsal region.

Long. 28.25 mm.  
 Lat. 14 „  
 Habitat—Andaman Islands.

*Modiola zebra*, sp. nov.

Shell mytiliform, curved, red elegantly rayed with bluish black inequidistant stripes, stained and polished with rich chestnut at the posterior side of the ventral margin, concentrically striate with irregular lines of growth; posterior side short, contracted; anterior side fan shaped; umboes high, narrow, whitish.

Long. 55 mm.  
 Lat. 27 „  
 Habitat—Andaman Islands.

Allied to *M. gubernaculum*, Dunk.,<sup>1</sup> of which the habitat is unknown; it is, however, more elongately oblong, and the system of painting is quite different; the umboes also are much narrower and higher and do not show the purple colouring so conspicuous in that species.

*Barbatia cancellata*, sp. nov.

Shell acuminate ovate, very inequilateral, gaping towards the anterior side, sculptured with oblique transverse ribs and somewhat distant concentric ridges, covered with a yellowish brown periostracum, a tuft of bristly hairs appearing posteriorly at the points of contact of the transverse ribs and concentric ridges; anterior side somewhat truncate; posterior side produced, roundly acuminate; dorsal margin straight; ventral margin anteriorly very oblique, posteriorly rounded; umboes broad, rather prominent.

Long. 13 mm.  
 Lat. 24'5 ,,  
 Habitat—Andaman Islands.

*Crassatella radiata*, Sow., var. *obsoleta*, var. nov.

Differing from the typical form in almost totally lacking the coloured rays which are so conspicuous a character of the species; in the present variety these only appear as indistinct spots and small blotches of a pale rusty red.

Habitat—Andaman Islands.

*Kellia mirabilis*, sp. nov.

Right valve oblong-subquadrate, rather tumid, inequilateral, yellowish white, with a broad bluish white central oblique band extending from the umboes to the ventral margin, sculptured throughout with wavy punctate ridges presenting a curious and beautifully fine, granular appearance; anterior side rather short, rounded; posterior side more angularly rounded; ventral margin straight.

Long. 11 mm.  
 Lat. 15'25 ,,  
 Habitat—Andaman Islands.

It is impossible to adequately describe the wonderful sculpture of this shell which is so striking in every way and so widely different from any hitherto described species of the genus, that I have considered the single valve represented in the Warneford collection worthy of special notice and description.

*Scintilla citrina*, sp. nov.

Shell oval, translucent, pale lemon colour, concentrically striate with lines of growth, faintly scratched with very fine transverse striæ; anterior side rounded; posterior side slightly acuminate below; lateral margin sloped; umboes small but prominent.

Long. 7 mm.  
 Lat. 10 ,,  
 Habitat—Andaman Islands.

*Scintilla elongata*, sp. nov.

Shell oblong-elongate, nearly equilateral, rather convex, gaping in the middle, concentrically striate, polished, semi-transparent white, minutely freckled throughout with opaque milk-white spots; anterior side rounded; posterior side somewhat angularly rounded; dorsal margin straight; ventral margin contracted in the middle.

Long. 6 mm.  
 Lat. .. .. 13 ,,  
 Habitat—Andaman Islands.

*Scintilla perplexa*, sp. nov.

Shell oblong, nearly closed, semi-transparent, cream colour, finely, concentrically striate and bearing traces of very fine oblique, transverse striæ; anterior side obtusely angled; posterior side rather larger than anterior side, somewhat squarely rounded, expanded above and more inflated.

Long. 7 mm.  
 Lat. 11.5 ,,  
 Habitat—Andaman Islands.

*Scintilla translucida*, sp. nov.

Shell roundly ovate, moderately compressed, very thin, transparent, marked with very minute transverse striæ and concentric lines of growth, some of which are milky white; slightly gaping at both ends; umboes small, nearly central.

Long. 11 mm.  
 Lat. 15 ,,  
 Habitat—Andaman Islands.

Allied to *S. jukesi*, Desh., from Australia; the present species is, however, much thinner, more transparent and more roundly ovate; it is also polished, whereas *S. jukesi* is quite dull and opaque.

*Hemicardium hystrix*, Reeve, var. *brevispinosa*, var. nov.

Distinguished from the typical form by its much shorter and more closely set spines, and by the absence of the scarlet lines in the interstices between the ribs; the pink colouring is also confined to the extreme umbonal region and lateral margins.

Habitat—Andaman Islands.

All the specimens examined from the Andamans are identical in these respects, and it appears to be a well-marked local variety.

*Tapes albomarginata*, sp. nov.

Shell ovate, flesh coloured, obsolete rayed with purple, sculptured with regular, prominent, raised liræ; anterior side somewhat angularly rounded; posterior side almost truncately obtuse; dorsal margins gently sloped; lateral and ventral margins creamy white; umboes small, white, stained with pale, livid purple.

Long. 24 mm.  
 Lat. 36.5 ,,  
 Habitat—Andaman Islands.

*Batissa capillata*, sp. nov.

Shell sub-trigonal, inequilateral, thick, rather inflated, covered with a dark, brownish black periostracum except in the umbonal region where erosion has taken place, sculptured with coarse, irregular, concentric growth-lines which are obliquely crossed posteriorly with coarse hair-like ridges; anterior side somewhat angularly rounded; posterior side slightly produced, obscurely angled; ventral margin rounded; ligament large, prominent; cardinal teeth broad and very coarse; anterior lateral teeth elongated, finely striate; interior of shell purplish white, the purple staining deepening posteriorly.

Long. 74 mm.  
 Lat. 72 ,,  
 Habitat—Andaman Islands.

*Diplodonta insulsa*, sp. nov.

Shell obliquely sub-ovate, yellowish white, marked with fine, concentric growth-lines; anterior side obliquely rounded; posterior side rounded; dorsal margins gently sloped; ventral margin rounded; umboes small, not prominent.

Long. 8.5 mm.  
 Lat. 10 ,,  
 Habitat—Andaman Islands.

*Donax nuxfagus*, sp. nov.

Shell elongately oblong, yellowish flesh coloured, sculptured with fine, closely set transverse striæ and posteriorly with irregular, concentric grooves disappearing towards the middle of the shell; anterior side produced, rounded; posterior side acuminate rounded; anterior lateral margin gently sloped; posterior lateral margin more abruptly sloped; ventral margin undulately rounded; umboes rather large, livid purple.

Long. 8 mm.  
 Lat. 13.25 ,,  
 Habitat—Andaman Islands.

*Donax tiesenhauseni*, sp. nov.

Shell wedge shaped, yellowish, rayed with greyish purple, sculptured with very fine, concentric striæ and fine nearly obsolete transverse striæ, both becoming so much coarser posteriorly as to give that part of the shell a cancellate appearance; anterior side produced, obtusely rounded; posterior side abruptly truncate; anterior lateral margin gently, concavely sloped; posterior lateral margin arched; ventral margin straight; umboes white.

Long. 8.5 mm.  
 Lat. 13 ,,  
 Habitat—Andaman Islands.

*Donax trigonalis*, sp. nov.

Shell almost trigonal, convex, very truncate, pale bluish flesh colour, tinged posteriorly with livid purple, partly covered with a thin, yellowish periostracum, sculptured with fine concentric lines of growth and posteriorly with fine longitudinal striæ which become gradually coarser, giving to this part of the shell a cancellate appearance; anterior lateral margin sloped; posterior margin descending very abruptly; ventral margin rounded; umboes large, but not prominent; interior of shell pale flesh colour, changing to blackish purple in places.

Long. 9.5 mm.  
 Lat. 11 ,,  
 Habitat—Andaman Islands.

This species differs from *Donax incarnatus*, Chem., to which it appears to be most nearly related, by its more truncate form, more rounded ventral and straighter posterior margins.

*Psammobia obtusa*, sp. nov.

Shell ovately transverse, pale mauve, blotched and mottled with a darker shade of the same colour and rayed with interrupted bands of reddish violet, sculptured throughout with fine, concentric striæ and oblique ridges which appear as irregular, waved plications posteriorly; posterior side obtusely angled; anterior side rounded; umboes central; interior of shell mauve throughout.

Long. 24.5 mm.  
 Lat. 42 ,,  
 Habitat—Andaman Islands.

The present species at first sight recalls *P. ornata*, Desh.; it is, however, broader, shorter and more blunt on both sides than is that species, the mauve colour also easily distinguishes it from *P. ornata*, which is of a yellowish white colour; the coloration of the interior is also remarkable.

*Novaculina andamanensis*, sp. nov.

Shell oblong, elongate, inequilateral, constricted towards the middle, pure white, bearing traces of having been covered with a yellowish brown periostracum, concentrically striate; dorsal margin slightly sloped anteriorly; ventral margin excavated in the middle, anterior side rounded; posterior side produced, somewhat angled below; umboes small.

Long. 16.5 mm.  
 Lat. 37.5 ,,  
 Habitat—Andaman Islands.

*Tellina cancellata*, sp. nov.

Shell white, roundly ovate, sculptured with fine, radiate ribs and concentric ridges presenting a delicately cancellate appearance; posterior side slightly acuminate; anterior side rounded.

Long. 9.5 mm.  
 Lat. 12 ,,  
 Habitat—Andaman Islands.

This species may be separated from *S. pretiosa*, Desh. (= *costata*, Sow.), its nearest relation, by its more oval form, less pointed posterior side and much finer and more delicate sculpture.

*Tellina incisa*, sp. nov.

Shell elongately oval, white, discoloured towards the umbona region with reddish yellow, shining, slightly iridescent, sculptured with concentric lines of growth and indistinct, irregular transverse striæ; anterior side somewhat acuminate; posterior side bluntly beaked below, concavely truncate above, a notch appearing just above the termination of the beak which is stained a ferruginous brown; umboes small, inconspicuous.

Long. 12 mm.  
 Lat. 20.75 ,,  
 Habitat—Andaman Islands.

*Tellina jousseaumei*, sp. nov.

Shell roundly ovate, sub-equilateral, nearly equivalve, the left valve somewhat compressed, chalky white, bearing traces of a pale, greenish brown periostracum, marked with rather coarse concentric lines of growth and very fine, transverse striæ; anterior side rounded; posterior side more sharply rounded, flexuous, obtusely angled above; umboes small, central.

Long. 32.5 mm.  
 Lat. 39 ,,  
 Habitat—Andaman Islands.

*Tellina magnifica*, sp. nov.

Shell oblong ovate, white, polished, shining, inequilateral, concentrically striate with lines of growth crossed by fine, transverse oblique striæ, presenting a very finely cancellate appearance, especially in those regions which border on the lower and lateral margins of the right valve; anterior side acuminate rounded; posterior side produced, flexuous, rostrate; ventral margin slightly rounded; umboes small, rose coloured.

Long. 47 mm.  
 Lat. 73°75' ,,  
 Habitat—Andaman Islands.

*Strigilla densestriata*, sp. nov.

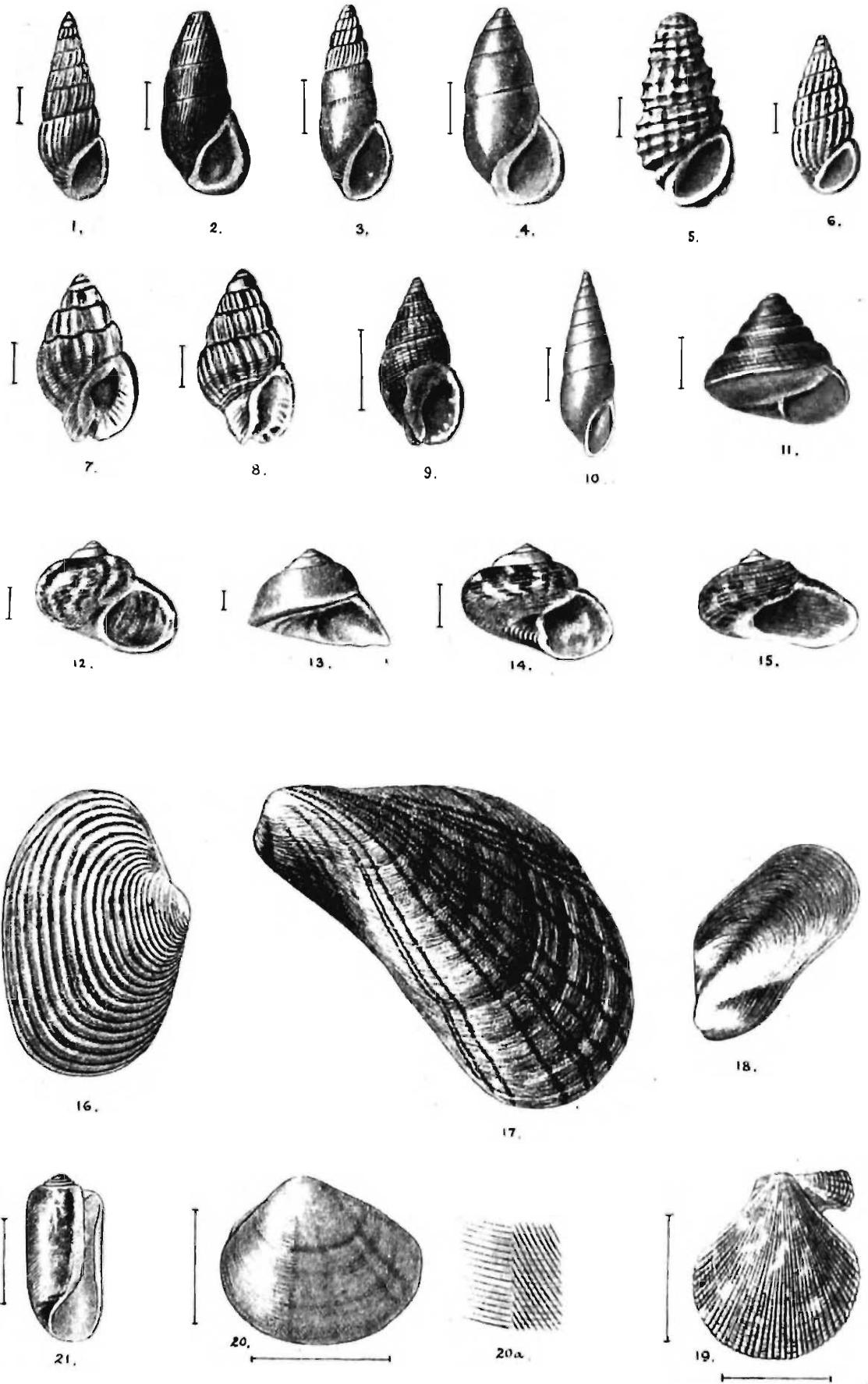
Shell sub-trigonal, slightly inequivalve, cream coloured, slightly flexuous posteriorly, sculptured on both valves anteriorly with concentric grooves, centrally with very fine, concentric striæ, crossed by fine oblique transverse grooves, and posteriorly with very fine, transverse striæ, and concentric grooves, the latter becoming much coarser near the margin; posterior margin descending obliquely and rather abruptly; anterior margin less abrupt; ventral margin rounded; umboes small.

Long. 14·5 mm.  
 Lat. 17' ,,  
 Habitat—Andaman Islands.



EXPLANATION OF PLATE XIV.

- |   |  |
|---|--|
| FIG. 1. <i>Rissoina angusta</i> .       | FIG. 12. <i>Margarita ponsonbyi</i> .                          |
| „ 2. <i>Rissoina cylindrica</i> .       | „ 13. <i>Risella balteata</i> .                                |
| „ 3. <i>Rissoina læta</i> .             | „ 14. <i>Solariella dulcissima</i> .                           |
| „ 4. <i>Rissoina pupiniformis</i> .     | „ 15. <i>Stomatella crenulata</i> .                            |
| „ 5. <i>Rissoina sculpturata</i> .      | „ 16. <i>Tapes albomarginata</i> .                             |
| „ 6. <i>Rissoina warnefordiæ</i> .      | „ 17. <i>Modiola zebra</i> .                                   |
| „ 7. <i>Nassa gerstenbrandti</i> .      | „ 18. <i>Modiola cymbula</i> .                                 |
| „ 8. <i>Nassa jucunda</i> .             | „ 19. <i>Chlamys andamanicus</i> .                             |
| „ 9. <i>Nassa tristis</i> .             | „ 20. <i>Strigilla densestriata</i> .                          |
| „ 10. <i>Styloptygma andamanensis</i> . | „ 20A. <i>Strigilla densestriata</i><br>(sculpture magnified). |
| „ 11. <i>Sitala denselata</i> .         | „ 21. <i>Tornatina conspicua</i> .                             |



ANDAMAN SHELLS.

EXPLANATION OF PLATE XV.

- |                                      |                                      |
|--------------------------------------|--------------------------------------|
| FIG. 22. <i>Melania charon</i> .     | FIG. 30. <i>Columbella suavis</i> .  |
| „ 23. <i>Melania expatriata</i> .    | „ 31. <i>Hamina callosa</i> .        |
| „ 24. <i>Melania multistriata</i> .  | „ 32. <i>Lucapinella gaylordæ</i> .  |
| „ 25. <i>Mangilia obtusa</i> .       | „ 33. <i>Macroschisma elegans</i> .  |
| „ 26. <i>Mangilia andamanensis</i> . | „ 34. <i>Drillia fraga</i> .         |
| „ 27. <i>Mangilia exasperata</i> .   | „ 35. <i>Drillia sikesi</i> .        |
| „ 28. <i>Conus edwardi</i> .         | „ 36. <i>Eulima balteata</i> .       |
| „ 29. <i>Clathurella selli</i> .     | „ 37. <i>Gyrineum wilmeriana</i> .   |
|                                      | FIG. 38. <i>Menestho acuminata</i> . |



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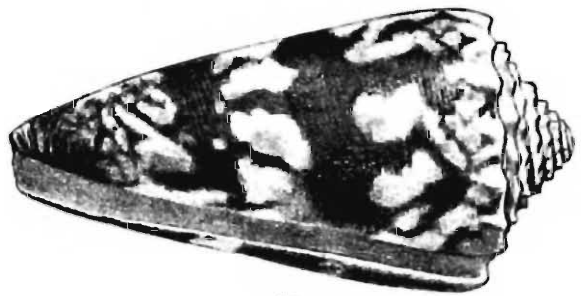
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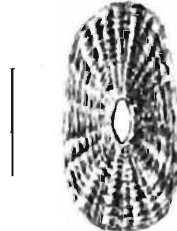
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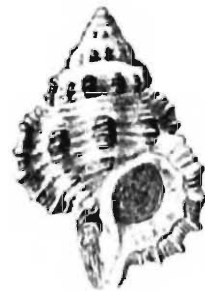
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38.

ANDAMAN SHELLS.

EXPLANATION OF PLATE XVI.

- |  |                                    |
|--|------------------------------------|
| FIG. 39. <i>Batissa capillata</i> .                | FIG. 48A. <i>Kellia mirabilis</i>  |
| „ 40. <i>Novaculina andaman-</i><br><i>ensis</i> . | (sculpture magnified).             |
| „ 41. <i>Psammobia obtusa</i> .                    | „ 49. <i>Alaba warnefordiana</i> . |
| „ 42. <i>Gibbula cœni</i> .                        | „ 50. <i>Atys convexa</i> .        |
| „ 43. <i>Gibbula ahena</i> .                       | „ 51. <i>Atys neglecta</i> .       |
| „ 44. <i>Leptothyra solida</i> .                   | „ 52. <i>Atys pacei</i> .          |
| „ 45. <i>Narica depressa</i> .                     | „ 53. <i>Atys vixumbilicata</i> .  |
| „ 46. <i>Acmxæa semicornea</i> .                   | „ 54. <i>Diplodonta insulsa</i> .  |
| „ 47. <i>Barbatia cancellata</i> .                 | „ 55. <i>Donax nuxfagus</i> .      |
| „ 48. <i>Kellia mirabilis</i> .                    | „ 56. <i>Donax tiesenhauseni</i> . |
|  | „ 57. <i>Donax trigonalis</i> .    |



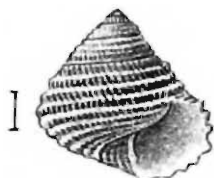
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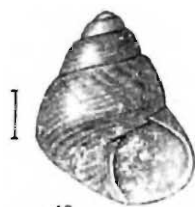
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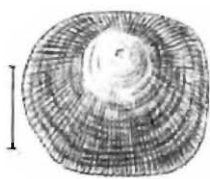
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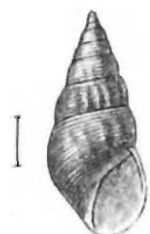
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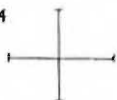
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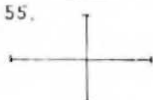
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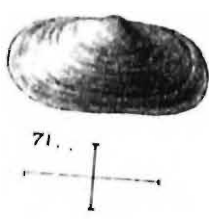
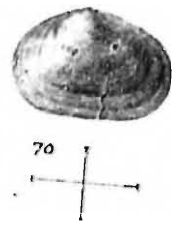
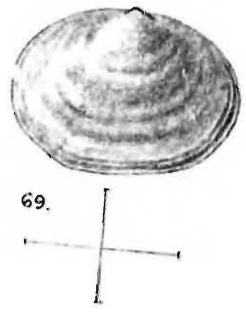
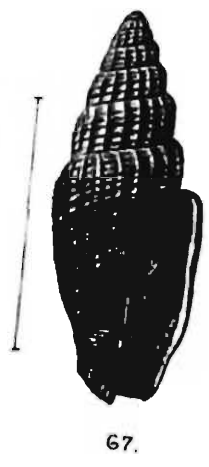
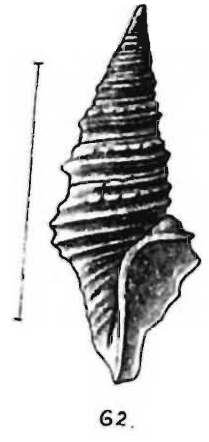
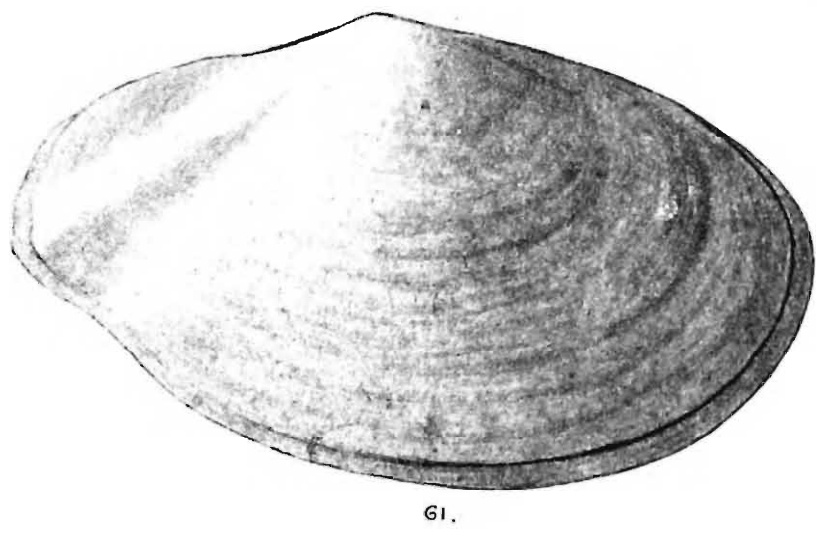
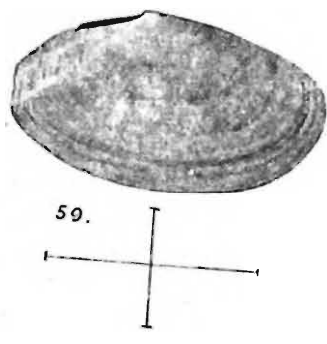
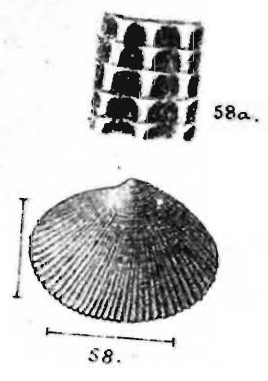
57.



ANDAMAN SHELLS.

EXPLANATION OF PLATE XVII.

- |  |  |
|--|--|
| FIG. 58. <i>Tellina cancellata</i> .                       | FIG. 64. <i>Terebra rubrobrunnea</i> . |
| „ 58A. <i>Tellina cancellata</i><br>(sculpture magnified). | „ 65. <i>Terebra unicolor</i> .        |
| „ 59. <i>Tellina incisa</i> .                              | „ 66. <i>Turbonilla foveolata</i> .    |
| „ 60. <i>Tellina jousseaumei</i> .                         | „ 67. <i>Mitra warnefordiana</i> .     |
| „ 61. <i>Tellina magnifica</i> .                           | „ 68. <i>Mitra emiliæ</i> .            |
| „ 62. <i>Pleurotoma rimata</i> .                           | „ 69. <i>Scintilla translucida</i> .   |
| „ 63. <i>Terebra carnicolor</i> .                          | „ 70. <i>Scintilla citrina</i> .       |
|  | „ 71. <i>Scintilla elongata</i> .      |
|  | FIG. 72. <i>Scintilla perplexa</i> .   |



## ERRATA.

Page 249, line 5 from bottom. *For* " figs. 2 and 3 " *read* " figs.  
2 and 1."

„ 253, under " Mishmi average " and opposite " Length of  
horn." *For* " 571 " *read* " 509."

# Publications of the Indian Museum.

	Rs. As.		Rs. As.
Account of the Deep-sea Brachyura collected by the R.I.M.S. "Investigator." By A. Alcock, M.B., C.M.Z.S.	6 0	Catalogue of Moths of India, Parts I to VII. By E. C. Cotes and C. Swinhoe, F.L.S., F.Z.S., etc.	5 12
Account of the Deep-sea Madreporaria collected by the R.I.M.S. "Investigator." By A. Alcock, M.B., C.M.Z.S.	4 0	Echinoderma of the Indian Museum: Account of the Deep-sea Holothurioida collected by the R.I.M.S. "Investigator." By R. Kœhler and C. Vaney	16 0
Account of the Triaxon (Hexactinellid) sponges collected by the R.I.M.S. "Investigator." By F. E. Schulze, Ph.D., M.D.	15 0	Echinoderma of the Indian Museum: Shallow-water Holothurioida collected by the R.I.M.S. "Investigator." By R. Kœhler and C. Vaney	2 0
Account of the Alcyonarians collected by the R.I.M.S. "Investigator," Part I. By J. Arthur Thomson, M.A., and W. D. Henderson, M.A., B.Sc.	16 0	Echinoderma of the Indian Museum: Deep-sea Ophiuroidea collected by the R.I.M.S. "Investigator." By R. Kœhler	10 0
Aids to the identification of Rats connected with Plague in India. By W. C. Hossack, M.D.	0 8	Echinoderma of the Indian Museum: Shallow-water Ophiuroidea collected by the R.I.M.S. "Investigator." By R. Kœhler	4 0
Catalogue of the Archæological Collections in the Indian Museum, Parts I and II. By J. Anderson, M.D., LL.D., F.R.S.	4 12	Figures and Descriptions of Nine Species of Squillidæ from the Collection of the Indian Museum. By J. Wood-Mason, F.Z.S., etc., edited by A. Alcock, M.B., C.M.Z.S.	2 0
Catalogue of Coins of the Indian Museum, Parts I to IV. By C. J. Rodgers, M.R.A.S., M.N.S.	24 0	Guide to the Zoological Collections exhibited in the Bird Gallery of the Indian Museum. By F. Finn, B.A., F.Z.S.	0 12
Catalogue of the Coins in the Indian Museum, Calcutta, including the Cabinet of the Asiatic Society of Bengal. Part I.—The Early Foreign Dynasties and the Guptas. Part II.—Ancient Coins of Indian Types. Part III.—Persian, Mediæval, South Indian, and Miscellaneous Coins. By Vincent A. Smith, M.A., F.R.N.S., M.R.A.S., I.C.S., Retd.	22 8	Guide to the Zoological Collections exhibited in the Fish Gallery of the Indian Museum. By A. Alcock, M.B., C.M.Z.S.	0 8
Catalogue of Indian Crustacea. Part I.—Introduction and Brachyura Primitiva. By A. Alcock, M.B., LL.D., F.R.S.	7 0	Guide to the Zoological Collections exhibited in the Invertebrate Gallery of the Indian Museum. By A. Alcock, M.B., C.M.Z.S. ( <i>Out of print</i> ).	
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