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MISCELLANEA (pp. 171—178).

The occurrence of *Gecko verticillatus* in Calcutta—*N. Annandale*. The distribution of *Kachuga sylhetensis*—*N. Annandale*. The distribution of *Bufo andersoni*—*N. Annandale*. Note on *Rutilla nitens*—*E. Brunetti*. Records of some Indian Cerambycidæ—*C. A. Paiva*. Notes on some Indian Hemiptera—*C. A. Paiva*. A preoccupied specific name in *Macrothrix*—*R. Gurney*. An enemy of certain Pearl Oysters in the Persian Gulf—*N. Annandale*. The distribution in India of the African Snail *Achatina fulica*—*N. Annandale*. Statoblasts from the surface of a Himalayan pond—*N. Annandale*. Notes on *Hispia lacustris*—*Captain H. J. Walton*, I.M.S.

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VI. REVISION OF THE ORIENTAL STRATIOMYIDÆ, WITH XYLOMYIA AND ITS ALLIES.

By E. BRUNETTI.

For some time I have been studying the *Stratiomyidæ* of the Oriental Region and the neighbouring parts of the Australian, partly for the purpose of revising the Indian Museum Collection in this group, and partly to enable me to identify my own captures during the last two years in India and other parts of the East, and the notes accumulated seem to be worth recording.

I intended including as *Stratiomyidæ* those genera which, under the older system of classification, would be placed in *Xylophagidæ*; but this would differ from the latest authorities, as in the elaborate new Catalogue of Palæarctic Diptera by Kertész, Becker, Bezzi and Stein this latter group is still retained as a separate family. Some authors have disbanded it, relegating species of the *Xylomyia* (*Subula*) group to the *Stratiomyidæ*, and the remainder (*Xylophagus* group) to the *Leptidæ*, with which they undoubtedly have strong affinities. *Xylomyia* approximates to *Beris* in many respects. Baron Osten Sacken noted this in 1882 in his critical remarks on Dr. Brauer's paper on the characteristics of the genera of the *Notacantha*, and he objected (to use his own words) to "the juxtaposition of *Subula* and *Xylophagus* in the same ultimate subdivision."

By structural characters, and by their metamorphoses, *Xylomyia* (*Subula* is preoccupied by Schummell in Mollusca, 1817) is much more related to the *Stratiomyidæ* than to *Xylophagus*, which latter genus is distinctly related to the *Leptidæ* and, in a less degree, to the *Tabanidæ* also.

In Aldrich's recent Catalogue of North American Diptera *Xylophagidæ*, as a family, is sunk bodily in *Leptidæ*, and *Cænomyia* with its allies added also. My own hesitation has been partly due to the costal vein in these genera being continued all round the edge of the wing, as in most other Brachycera, instead of terminating suddenly at the tip of the wing or just beyond it, which latter characteristic is peculiar to the *Stratiomyidæ*: also partly, to the variation from the typical venation, a character in which the *Stratiomyidæ* are strikingly consistent. Without expressing any definite opinion, having only casually studied the question of

affinities, it seems to me that *Xylomyia* and its allies would be best placed with *Cænomyidæ*, the family name of the latter retained, and the group placed next to the *Stratiomyidæ*, followed by the *Acanthomeridæ* as a family, followed again by the *Tabanidæ* and *Leptidæ* (including *Xylophagus* and its allies).

However, so far as this paper is concerned, I retain *Xylomyia* and the allied genera as a separate group.

The material in the Indian Museum in this family is not abundant in either species or specimens, and my own labours have only resulted in a limited number of both. For this reason it is to be regretted the more that a personal reference to Walker's types in the British Museum has been impossible, since about half the species in the family are his. Baron Osten Sacken's view to the effect that writings on the fauna of a region imperfectly known should be considered as preparatory and not final results seems correct, and his opinion that a writer is not "called upon to describe as new every specimen that he cannot identify" is echoed by my own. Therefore I am not sure whether analytical tables of genera and species should have been presented, for owing to my inability to obtain specimens of the majority of the species, the tables have had to be drawn up mainly from descriptions, and will be open to improvement on a better personal acquaintance with a larger proportion of the species.

GROUP XYLOMYINÆ.

Table of genera.

3rd and 4th externo-medial veins not united	<i>Xylomyia</i> Rond.
3rd and 4th externo-medial veins united	
just before the border of the wing.	
Thorax elongo-quadrato, discal cell 3	
times as long as broad	<i>Rhachicerus</i> Wlk.
Thorax much longer than broad,	
discal cell 4 times as long as	
broad	<i>Rhyphomorpha</i> Wlk.

Xylomyia Rond., 1861.

Subula Mg., 1820; Sys. Besch., ii, 15.

(Preoccupied by Schummell in Mollusca, 1817.)

Solva Wlk., 1860, Proc. Linn. So., Lond., iv, 98.

Osten Sacken, in 1880, in his "Enumeration of the Diptera of the Malay Archipelago," says, "There is no necessity for a new genus *Solva* Wlk.; it is simply a *Subula* closely resembling in structure and colouring the European and North American species"; and as he has examined Walker's type in the British Museum, the identity may be held proved.

Table of species.

Posterior femora normal, not thickened.

Legs without black markings.

Abdomen luteous, with dorsal
darker spots Long. 4 mm.¹ *flavipes* Dol.

Abdomen cinereous black,
testaceous at sides and on
posterior borders each seg-
ment Long. 5½—6 mm. *inamæna* Wlk.

Legs with black markings.

Abdomen uniformly blackish-
brown Long. 3½ mm. *vittata* Dol.

Abdomen black with yellow
testaceous marks. Long. 10 mm. *calopodata* Big.

Posterior femora incrassated Long. 6—8 mm. *hybotoides* Wlk.

X. flavipes Dol., 1858.

(*Subula*) Nat. Tijd. Ned. Ind., xvii, 85.

Amboina. Closely allied to *inamæna* Wlk., for which Osten Sacken would have taken it, except for the brown antennæ of the latter. Having seen neither species, it appears to me that the difference in size and abdominal markings (though these latter are not so real as would appear on a first reading) would be a better means of separation.

Van der Wulp reports ♂ ♀ ♀ from New Guinea.

X. inamæna Wlk., 1860.

(*Solva*) Pr. Linn. So., iv, 98.

♀ Java, Celebes. Osten Sacken records two ♀ ♀ from Kandari (Celebes), taken in April 1874.

X. vittata Dol., 1858.

Nat. Tijd. Ned. Ind., xvii, 86.

♂ Amboina. 1 ♂ April.

X. calopodata Big., 1879.

Ann. So. Ent. Fr. (1879), 195.

♀ Ternate. Type in the Bigot Collection—now in the possession of Mr. Verrall, the English dipterologist.

X. hybotoides Wlk., 1862.

(*Solva*) Pr. Linn. So., vi, 5.

♂ ♀ Gilolo. The type of this species is said to be in the British Museum, but Osten Sacken did not find it there.

¹ All lengths given in this paper are in millimetres.

Rhachicerus Hal. in Wlk., 1848.

List Dipt. Brit. Mus., i, 124 (*nomen nudum*) and v, 103
(1854) description.

No description is given in the first reference, but a full description of the ♂ only is given in the second. I think, therefore, the date of the genus ought to be altered to 1854, but I have followed precedent in keeping it 1848. Only three oriental species are known; all closely allied.

Larger sp. Thorax and abdomen more
reddish—wings more brownish, and
cloud in wings much larger *fulviciornis* Sn. v. Voll.
Long. 12·13 mm. Thorax brownish yellow
—wings with less brown *zonatus* O.S.

R. fulvicornis Sn. v. Voll., 1863.

(*Antidoxion* Versl. en Meded. Kon. Acad. v. Weten xv, 1,
figs. 1—3. ♀ Java. Type in Leyden Museum.

Antidoxion of Voll. (1863) was recognised by Gerstaecker in the same year (Entom. Bericht, 1863, p. 410) as a synonym of *Rhachicerus* and Osten Sacken sees no justification in their separation. I have not seen a description of this species.

R. zonatus O. S., 1880.

Ann. Mus. Gen., xvi, 408.

♀ Mt. Singalang (Sumatra), July 1878. Long. (without ovi-
positor) 12·13 mm.

R. nigrinus Wandolleck, 1897.

Ent. Nach., xxiii, 290.

This species is described from Sumatra.

Rhyphomorpha, Wlk., 1861.

Pr. Linn. So., v, 275.

R. bilinea Wlk., 1861.

Pr. Linn. So., v, 275.

♀ Batjan. Long. 6 mm. The type should be in the British Museum, but Osten Sacken has not found it there.

FAMILY STRATIOMYIDÆ.*Table of sub-families.*

- | | |
|--|-------------------------|
| A Abdomen of 7 segments | <i>Berinae</i> . |
| AA Abdomen of 5 or 6 segments. | |
| B Discal cell, or this and the anterior basal cell together, emitting 3 veins. Abdomen short, often shorter than thorax and nearly always much wider | <i>Pachygastrinae</i> . |

- BB Discal cell, or this and the anterior basal cell together, emitting 4 veins. Abdomen nearly always much longer than thorax and generally only slightly wider. When much broader, abdomen quadrate (*Stratiomyinæ* only).
- C Abdomen linear, oval or elliptical, not quadrate, antennæ of various forms.
- D Antennæ always setiform, scutellum unspined, species nearly always of bright metallic colour *Sarginæ*.
- DD Antennæ mostly stylate rarely setiform (e.g., in *Oxycera*, etc.) Scutellum spined or not. Species rarely metallic.
- E Abdomen oval, sometimes very short, often broader than thorax *Clitellarinæ*.
- EE Abdomen elongate and always longer than thorax—barely wider *Hermetilnæ*.
- CC Abdomen always approximately or nearly quadrate. Antennæ of three distinct joints, cylindrical *Stratiomyinæ*.

SUB-FAMILY I.—BERINÆ.

There is only one oriental species of this sub-family, namely *Beris javana*, V d. Wulp, 1892, Dipt. Mid. Sumatra, 13. The author mentioned a ♀ as that of the *Beris javana* described by Macquart in Dipt. Exot., i, pt. 2, 188; but Osten Sacken having seen the type in the Paris Museum wrote to Van der Wulp, saying that the species was “*either an Evaza or a Tinda, at any rate not a Beris; Beris javana* V d. Wulp *must be a different species.*” The name therefore stands good for Van der Wulp’s ♀ from Sumatra (taken at Rawas), it being impossible for the latter entomologist to mistake a *Beris* for a species of any other sub-family.

SUB-FAMILY II.—PACHYGASTRINÆ.

Table of genera.

- A Antennæ sprayed *Ptilocera* Wied.
- AA Antennæ of various forms, but not sprayed.
- B Body elongate, nearly linear; abdomen not much broader than thorax.
- C Scutellum 4-spined.
- D Antennal style narrow, not distinctly plumose. Scutellar spines small, of equal length. Small transverse vein absent *Tinda* Wlk.
- DD Antennal style long, feathered, distinctly plumose on both sides. Inner

- pair of scutellar spines much longer than outer. Small transverse vein present *Rosapha* Wlk.
- CC Scutellum unspined.
- E Posterior femora elongated, thickened, with spines below at tip *Enoplomyia* Big.
- EE Posterior femora not thickened, nor elongated.
- F Antennæ long and linear, thin.
- G Abdomen distinctly longer than thorax *Salduba* Wlk.
- GG Abdomen short and round *Acraspidea* Brauer.
- FF Antennæ very short, 3rd joint round *Adraga* Wlk.
- BB Body short, transverse. Abdomen generally much broader than thorax.
- H Scutellum 4-spined.
- I Abdomen only slightly longer or slightly shorter than thorax; scutellum normal.
- J Last antennal joint leaf-shaped *Phyllophora* Mcq.
- JJ Last antennal joint not leaf-shaped.
- K Abdomen rather flat, elliptical, nearly bare, little longer but hardly broader than thorax *Evaza* Wlk.
- KK Abdomen thick, nearly round.
- L 3rd antennal joint round *Culcua* Wlk.
- LL 3rd antennal joint cylindrical *Acanthina* Wied.
- II Abdomen only about half the length of thorax. Scutellum large, with marginal suture *Obrapa* Wlk.
- HH Scutellum with 2 short spines *Wallacea* Dol.
- HHH Scutellum unspined *Pachygaster* Meig.

Ptilocera Wied., 1830.

Ausser. Zwief., ii, 58.

Table of species.

Thorax with well-defined bright green stripes.

4 stripes; wings brownish with abbreviated testaceous fascia Long. 7 mm. *fastuosa* Gerst.

2 stripes; wings nearly clear. Long. 10 mm. *smaragdifera* Wlk.

Thorax without well-defined stripes.

Thorax with gold pubescence in front and at sides Long. 8 mm. *quadridentata* F.

Thorax without such gold pubescence

Antennæ (presumably) all black Long. 8 mm. *smaragdina* Wlk.

Antennæ with the tip white Long. 7 mm. *continua* Wlk.

N.B.—From the description of *amethystina* Sn. v. Voll. I can find no characters to separate it from *fastuosa* Gerst., so cannot include it in above table.

Pt. quadridentata Fab., 1805.

Sys. Antl., 86.

Fabricius describes the ♀ only.

In his *Ausser. Zweifl.*, ii, 59, Wiedemann gives a better and longer description of both sexes. This species is generally distributed in the East: Malacca, Singapore, Amboina, Sumatra, Philippine and Aru Islands, Djokjokarta (Java), Makassar (Celebes), Papua.

Pt. fastuosa Gerst., 1857.

Linn. Entom., xi, 332.

(*smaragdina* Sn. v. Voll.)

Gerstaecker described it from a ♀ from Ceylon. Schiner records 3 ♂♂ from Tellschong (Nicobar Islands) which agree well with the species, and Meijere received 2 ♀♀ from Mañokwari (Papua) taken at the end of May.

Pt. smaragdifera Wlk., 1859.

Pr. Linn. So., iv, 94.

Makassar (Celebes), Philippine Islands.

Pt. continua Wlk., 1851.

Ins. Saunds. Dipt., II, 84, pl. iii, 2.

♀ Java. Two ♀♀ named by Bigot, from the Andaman Islands are included in the Indian Museum Collection.

Pt. smaragdina Wlk., 1849.

List Dip. Br. Mus., iii, 525.

Ceylon, Celebes, Philippine Islands. Osten Sacken examined a series of 30 from Celebes, 3 from Ternate, 3 from Papua and 1 from Amboina, thinking *Pt. amethystina* Sn. v. Voll. the same species; he added, "In 2 ♀♀ from Amboina and Papua, the greater part of the anal cell, and a portion of the 4th posterior are almost hyaline, while the interval between the anal cell and the costal margin is much darker brown than the distal half of the wing."

Pt. amethystina Sn. v. Voll., 1858.

Tijd. v. Ent., i, 92.

Java, Celebes, Philippine Islands. Three of each sex from the Philippine Islands are referred by Osten Sacken to this species; which he thought hardly to be separated from *smaragdina* Sn. v.

Voll. This latter species is considered a synonym of *fastuosa* Gerst. by Van der Wulp in his recent Cat. Dip. S. Asia, and as he probably had material on which to form a definite opinion, I follow him both in the synonymy and also in admitting *amethystina* Sn. v. Voll. as a distinct species, but with an impression that the latter form is but *fastuosa* Gerst.

Tinda Wlk., 1860.

Pr. Linn. So., iv, 101.

Table of species.

Antennal style 3 times as long as rest of
3rd joint Long. 6 mm. *indica* Wlk.
Antennal style twice as long as rest of 3rd
joint.
Scutellum with yellow posterior border Long. 6 mm. *acanthi-*
noides Jaen.
Scutellum black, legs reddish, posterior
femora black marked Long. 6 mm. *recedens* Wlk.

T indica Wlk., 1851.

(*Biastes indicus* Saunders. Dip., II, 81, pl. iii, 1 and 1a.)

(♀ *Tinda modifera*, Wlk., Pr. Linn. So., iv, 101.)

(*Phyllophora bispinosa*, Thoms., Eugen Reise, 454.)

♂ Locality not given by Walker. Celebes, Manila. This, the first species described of those now included in *Tinda*, was described under *Biastes*, created by Walker for it, but *Biastes* being preoccupied in Hymenoptera, *Tinda* must stand. Osten Sacken in his "Enumeration, etc." speaks of 4 ♂♂ from Kandari (Celebes) taken in April 1874 and remarks that the scutellum ("even in the type specimen") has 4 and not 6 spines as Walker says; but Walker queried his assertion as to the number of spines in his genus *Tinda*. Regarding *Biastes* Walker plainly says, "armed with 4 short tawny teeth," and his excellent figure shews but 4. Osten Sacken, whilst not sinking the genus *Phyllophora* Mcq., suspects that Walker's *P. angusta* from Singapore may be a *Tinda*. I find 2 ♂♂ in the Indian Museum Collection from Calcutta and Margherita (Assam).

T acanthinoides Jaen., 1868.

(*Elasma*) Neue Exot. Dipt., 15, pl. i, 3.

♀ Java. The author placed this genus (*Elasma*) between *Acanthina* and *Phyllophora*. Type in the Heyden Collection which, I believe, is now in the Frankfort Museum.

T recedens Wlk., 1861.

Pr. Linn. So., v 233.

♂ Dorey (Papua).

Rosapha Wlk., 1860.

Pr. Linn. So., iv, 100.

Osten Sacken corrects the author's error in saying 2 instead of 4 spines to the scutellum, and Meijere's splendid coloured plate of *bimaculata* shews 4, the inner pair much the longer.

R. habilis Wlk., 1860.

Pr. Linn. So., iv, 100.

♂ ♀ Long. 7 mm., Makassar (Celebes). Osten Sacken reports a ♀ from Kandari (Celebes) dated April 1874, and observes that the extent of black in the abdomen varies, and that the black mark on the thorax is sometimes wanting.

R. bicolor Big., 1879.

(Calochætis) Ann. So. Ent. Fr. (1879), 189.

(Calochætis, misprinted Calcochætis) Big., Bull. So. Ent. Fr. (1879), p. lxxiv.

♀ Manila. Type in Bigot's Collection.

R. bimaculata Meij., 1904.

Bijd. Dierk., xviii, 96 ; pl. viii, 13, 14.

♂ Java. Long. 6 mm. Gunong Tji Salimar. W Preanger (Java).

I should not be surprised to find that the three just mentioned represent but a single species. Walker describes both sexes, mentioning that the abdomen is clear tawny in the ♂ and with the centre blackish in ♀ Bigot says "centre of abdomen blackish" (a ♀) and Meijere differentiates his species from Bigot's by the clear, reddish yellow abdomen. His type is a ♂ and perhaps he had not seen Walker's description of sexual differences.

The three descriptions read surprisingly alike, and the only character I can find that may separate the species is that *bicolor* and *bimaculata* have the brownish cloud towards the tip of wings separated by a clear hyaline space from the dark stigma, which clear space is not mentioned in Walker's species.

Osten Sacken has specimens from the Philippines shewing the hyaline space referred to by Bigot. Walker speaks of an elongated black spot on the front of the thorax in *habilis*, which seems only another way of describing Bigot's species *bicolor*—"longitudinal band from anterior to middle of disc"; this black mark, Osten Sacken announces to be variable.

Should my surmise be correct, the wing marks would be the best means of separating the species, as follows:—

Wings with darker cloud around stigma
extending towards tip. Stigma fer-
ruginous brown. ♂ Abdomen uni-
colorous tawny : in ♀ centre of abdo-
men blackish

habilis Wlk.

Wings with subapical brown cloud separated from the blackish stigma by a clear hyaline space. ♂ abdomen clear reddish yellow. ♀ dark in centre

(*Calochætis*) *bicolor* Big.

(Syn. *Rosapha bimaculata* Meij. ♂.)

Osten Sacken (in his "Enumeration") regards *bicolor* Big. as a doubtful synonym of *habilis*, and Meijere notices the resemblance of his species to Bigot's. I fear Meijere's distinctions of colour in the proboscis and the halteres is insufficient to build a species on in a variable group. This being so, it is a question of the two species above being distinct, unless all are the same species, in which case *habilis* stands.

Enoplomyia Big., 1878.

Ann. Ent. So. Fr. (5) VIII Bull., p. xxii.

E. cothurnata Big., 1878.

Bull. Ent. So. Fr. (1878), p. 44.

♀ Batjan. Long. 10 mm. Bigot Collection.

Adraga Wlk., 1859.

Pr. Linn. So., iii, 82.

A. univitta Wlk., 1859; *l.c.*, 82.

♂ Mysol, Aru. Islands. Long. 6 mm.

Salduba Wlk., 1859.

Pr. Linn. So., iii, 79.

Table of species.

- A Moderate sized species, 6 to 11 mm. long.
- B Scutellum unarmed, antennæ not placed on a protuberance. Thorax striped, abdomen linear.
- C Abdomen nearly twice as long as thorax. Femora red, posterior femora incrassated Long. 6—9 mm. *singularis* Wlk.
- CC Abdomen a little longer than thorax. Femora yellow, black or brown (reddish in *gradiens* only). Femora not incrassated.
- I. Legs red or yellowish.

Abdomen normal, length of body 6—9 mm.

Thorax with 2 indistinct cinereous stripes. Legs mainly reddish Long. 6—8 mm. *gradiens* Wlk.

Thorax with 4 gilded tomentum stripes. Legs mainly luteous Long. 6—9 mm. *hilaris* Wlk.

Abdomen clavate. Length of body 11 mm. Thorax with 4 cinereous stripes, centre pair joined on scutellum. Legs mainly yellow Long. 11 mm. *areolaris* Wlk.

2. Legs mainly whitish. Thorax with 4 gilded tomentum stripes Long. 9 mm. *diphysoides* Wlk.
3. Legs all black, except white base of tarsi. Thorax with a cinereous stripe each side Long. 7 mm. *lugubris* Wlk.
- BB Scutellum with 4 minute teeth. Antennæ placed on a protuberance. Thorax (presumably) all black. Abdomen fusiform Long. 6 mm. *scapularis* Wlk.
- AA Small species 3 to 4 mm.
- 3rd antennal joint elliptical, anterior femora with black traces. Long. $3\frac{3}{4}$ mm. *signatipennis* V Wulp.
- 3rd antennal joint round, legs all pale yellow. Long. 3 mm. *exigua* V Wulp.

This genus was placed by Walker in the subfamily *Sarginae* and puzzled me for a long time, the nearly uniform black colour of all the species being such a contrast to the usual brilliant metallic colours in this group. Not being able to obtain a specimen, I was about to leave it where it was, when I obtained Van der Wulp's paper on New Guinea Diptera, in which he not only describes two new species (which may both be removed later owing to formation of the antennæ) but gives a diagram of the wing of *Salduba* shewing only three veins issuing from the discal and basal cells combined, thus placing it at once in the *Pachygastrinae*.¹ Walker made no mention of this venation, nor had I any information on the point. The species *S. melanaria* Wlk., formed by Van der Wulp into a new genus *Cænocephalus*, has 4 veins instead of 3 and therefore cannot be placed in *Pachygastrinae*. This new genus seems by its linear abdomen and form of antennæ to approach nearest to the *Hermetiinae*, where I bring it for the present.

Three other species of the restricted *Salduba* shew aberrant forms of abdomen—*scapularis* with fusiform abdomen and 4 minute teeth on the scutellum; while *singularis* with incrassated posterior femora minutely spined below, and the abdomen double the usual length may easily form the type of a new genus. *S. areolaris*, with its clavate abdomen, may also be regarded later as generically distinct.

S. singularis Wlk., 1861.

Pr. Linn. So., v, 271.

♂ ♂ Batjan. A ♂ is recorded from Ramoi (Papua). Osten Sacken thinks it differs from *gradiens* Wlk. only by less white at the base of the posterior tarsi and much more distinct spines on the hind femora. The incrassated posterior femora and abdomen of nearly double the usual length might entitle this species to generic separation.

¹ Van der Wulp also expressed his opinion of its affinity with *Tinda*.

S. gradiens Wlk., 1864.

Pr. Linn. So., vii, 203.

♀ Mysol. Type in British Museum Collection. Osten Sacken doubtfully refers to this species a single ♂ from Ramoi (Papua) taken February, 1875.

S. hilaris Wlk., 1861.

Pr. Linn. So., v, 271.

♂ ♀ Batjan. Has been queried as a var. of *diphysoides*.

S. areolaris Wlk., 1864.

Pr. Linn. So., vii, 204.

♂ Mysol. Allied to *hilaris* and *diphysoides*.

S. diphysoides Wlk., 1859.

Pr. Linn. So., iii, 79.

♂ Aru Islands.

S. lugubris Wlk., 1861.

Pr. Linn. So., v, 271.

Batjan.

S. scapularis Wlk., 1861; *l.c.*, 271.

♂ Batjan. It has been suggested that this may belong to Van der Wulp's new genus *Cænocephalus*, but this depends on its venation. Its fusiform abdomen and minutely spined scutellum might, however, entitle it to generic or subgeneric rank.

S. signatipennis V. d. Wulp, 1898.

Termés. Fuzet., xxi, 412, pl. xx, fig. 2 (head), fig. 2a (wing).

♂ ♀ Friedrich Wilhelmshafen (Papua).

S. exigua V. d. Wulp, 1898.

Loc. cit., 413; pl. xx, fig. 3 (head).

♂ One from Erima, Astrolabe Bay (Papua). The author rather doubts its right to a place in this genus, owing to the roundness of the 3rd antennal joint. This joint in *signatipennis* being elliptical instead of cylindrical forms a link between *exigua* and the other species and perhaps justifies them both remaining.

Acraspidea Brauer, 1882.

Denk. Kais. Acad. Wissens. Wien, xliv, 75.

A. felderi Brauer, 1882, *l.c.*, 75.

♂ Rambodde (Ceylon). Long. 5—6 mm.

Phyllophora Mcq., 1838.

Dip. Ex., i, pt. i, 178.

This generic name pre-occupied by Thunberg in Orthoptera.

P. angusta Wlk., 1857.

Pr. Linn. So., i, 7.

♂ Singapore. Long. 5 mm. This may be a *Tinda*, according to Osten Sacken.

Evaza Wlk., 1857.

Pr. Linn. So., i, 109.

(Nerua—sometimes misprinted Nerna—Wlk., 1858.)

Pr. Linn. So., ii, 81.

Most authors have been spelling this genus *Evasa*, but Kertész in his recent monograph of the genus in Ann. Mus. Hong., vol. iv, 276, reverts to the original form. He alludes also to a closely allied genus of Walker's, *Artemita*, from S. America, differentiated from *Evaza* by having pubescent eyes.

Table of species.

Legs principally blackish brown (anterior femora blackish brown, with more or less pale tips).

Scutellum with yellowish border Long. 8—8½ mm. *argyroceps* Big.

Scutellum all black, spines only
yellowish

Long. 5½—7 mm. *impedens* Wlk.

Legs principally yellow (anterior femora
yellow or yellowish brown).

Legs all yellow.

Scutellum black, with yellow spines,
dorsum of thorax and scutel-
lum distinctly arched, with
yellow hair

Long. 7 mm. *flavipes* Big.

Scutellum with posterior border
partly black, dorsum of tho-
rax and scutellum flat, with
yellowish white hair

Long. 7 mm. *bipars* Wlk.

Legs not all yellow.

Wing tips clear; all tibiæ all black
or blackish brown

Long. 9 mm. *tibialis* Wlk.

Wing tips not clear, tibiæ not
throughout unicolorous.

Abdomen reddish brown,
partly blackish brown.

Wings hyaline, fore-
border brown from

subcostal cell to
 apex Long. 5—6 mm. *mollis* O. Sack.
 Wings very pale brown ;
 only subcostal cell
 brown Long. $5\frac{1}{2}$ — $7\frac{1}{2}$ mm. *fulviventris* Big.
 Abdomen principally black
 or blackish brown.
 Tibiæ of middle and pos-
 terior legs brown or
 blackish brown at api-
 cal half Long. 9 mm. *fortis* Wlk.
 Tibiæ of middle and pos-
 terior legs all yellow
 Anterior radial cell
 clear Long. $6\frac{1}{2}$ mm. *indica* Kert.
 Anterior radial cell
 brownish Long. 6 mm. *scenopinoides*
 Wlk.

E. argyrocephs Big., 1879.

Ann. So. Ent. Fr. (1879), 219.

♀ Moluccas. Bigot Collection. The author describes the ♂ only, but Kertesz's description applies to both sexes, from 3 ♂ ♂ and a ♀ in the Bigot Collection.

E. impendens Wlk., 1860.

Pr. Linn. So., iv, 197.

♂ ♀ Makassar (Celebes), Aru Islands. Osten Sacken mentions 9 ♂ ♂ 1 ♀ from Kandari (Celebes), April, 1874.

E. flavipes Big., 1879.

Ann. So. Ent. Fr. (1879), 219.

♀ India. Bigot Collection (badly preserved). Van der Wulp gives a ♂ from Friedrich Wilhelmshafen (Papua).

E. bipars Wlk., 1857.

Pr. Linn. So., i, 110 ; pl. vi, 2.

(*E. flavipes* V. d. Wulp, Térmes. Fuzet., xxi, 416, nec *flavipes* Big. (Ann.), 1879.)

♂ Sarawak (Borneo) ; Papua. Kertesz also records it and describes the ♀ from a New South Wales (badly preserved) specimen in the Hermann Collection.

E. tibialis Wlk., 1861.

(*Clitellaria*) Pr. Linn. So., i, 57.

♂ Manado (Celebes). In his Cat. Dipt. S. Asia, Van der Wulp mentioned that, having 4 spines to the scutellum, this species

“ might require a generic separation,” and Kertesz refers it now to *Evaza* with the support of Mr. E. E. Austen of the British Museum, who has examined the type.

E. mollis Os. Sacken, 1880.

(*Nerua*) Ann. Mus. Gen., xiv, 415.

♂ ♀ Sumatra ; Papua. The author differentiates his species from *fulviventris* Big. and *bipars* Wlk., to which it is allied.

E. fulviventris Big., 1879.

Ann. So. Ent. Fr. (1879), 220.

♂ Moluccas. Bigot Collection. Kertesz describes both sexes, recording it in the Hungarian National Museum from Papua, dated 14th July and 24th December.

E. fortis Wlk., 1865.

(*Sargus*) Pr. Linn. So., viii, 107.

E. pictipes Big., 1879, Ann. So. Ent. Fr. (1879), 221.

♂ Papua.

Kertesz, after Mr. E. E. Austen's corroboration from an examination of the type, places this species here, and sinks *pictipes* as a synonym.

The Hungarian Museum possesses specimens from Papuan localities (Bali, Mafor, Stephansort, Simbang, Erima, Sakelberg). Van der Wulp also records a ♀ from Erima, Astrolabe Bay, Papua, and Meijere mentions a ♂ from “ Oberes Jamur Gebiet,” dated August 6th.

E. indica Kert., 1906.

Ann. Mus. Hung., iv, 289.

♂ ♀ Bombay, taken by Mr. Biro, 3rd July 1902.

E. scenopinoides Wlk., 1859.

(*Nerua*) Pr. Linn. So., iii, 81.

(*E. pallipes* Big., 1879 ; Annales, 220.)

♀ Aru Islands, N. Ceram, Waigion, Gilolo, Dorey, Batjan, Papua.

The Hungarian Museum has it from Papua taken in April and September. Van der Wulp gives a ♂ from Friedrich Wilhelmshafen (Papua) and Osten Sacken mentions 1 ♂ 2 ♀ ♀ from Dorei Hum (Papua), February 1875, also from Andai (Papua).

Culcua Wlk., 1857.

Pr. Linn. So., i, 109.

C. simulans Wlk., 1857 ; *l.c.*, 109.

♂ Malacca, Sarawak.

A specimen in the Indian Museum Collection seems to form an undescribed species of this genus from Tennasserim.

Acanthina Wied., 1830.*

Ausser. Zweifl., ii, 50.

The two oriental species may be distinguished as follows :—

Thorax marked with a cross. Abdomen with a basal,
and 2 posterior silvery hair spots *azurea* Gerst.

Thorax unmarked, but with bright gold hair in front
Abdomen unmarked *auricollis* Big.

A. azurea Gerst., 1875.

Linn. Entom., xi, 335.

(Clitellaria obesa Wlk.)

Long. 7 mm. ♂ Ceylon, Ceram, Dorey (Papua), Batjan, Philippine Islands, Ramai and Andai in Papua (4 ♂ taken February 1875) also June and August 1872. Osten Sacken records the species as *C. obesa* Wlk., adding "very like *azurea* Gerst.," but mentions differences. He again (Dipt. Phil. Is., 1882) expresses doubt as to the identity of this species with 3 specimens examined by him from those Islands collected by Dr. Carl Semper.

A. auricollis Big.

♂ Kohima (Assam), Sadiya (Assam). Long. 8 mm. Type in Indian Museum.

I can find no reference to the description of this species, which appears distinct from *azurea* Gerst.

Obrapa Wlk., 1859.

Pr. Linn. So., iii, 82.

Table of species.

Body black.

Shining black ; body of normal width ;

wings clear

Long. 5 mm. *perilampoides* Wlk.

Dull black ; body narrower ; wings with

cloudy spot

Long. 44 mm. *celyphoides* Wlk.

Body with shining silvery hair

Long. 33 mm. *argentata* V Wulp.

* See end of paper for *A. argentea*, sp. nov.

O. perilampoides Wlk., 1859; *l.c.*, 82.

♀ Aru Islands, Batjan, Kaisaa, Mysol, Dorei.

O. celyphoides Wlk., 1859; *l.c.*, 83.

♀ Aru Islands, Batjan, Dorei. Walker adds further characters in the same journal, vol. v, 273, and separates it from *perilampoides* by the characters given above.

O. argentata V d. Wulp, 1898.

Termés. Fuzet., xxi, 417; pl. xx, 5.

1 ♂ from Tamara Berlinhafen (Papua).

Wallacea Dol., 1858.

Nat. Tijds. Ned. Ind., xvii, 82.

W. argentea Dol., 1858; *l.c.*, 82.

Gabasa argentea Wlk., Pr. Linn. So., iii, 80.

Amboina, not rare in April.

In the Indian Museum are ♀ ♀ from Calcutta, taken 8.1.06 and 14.3.07—also a ♀ from Mergui (Lower Burma). On 21.3.07 I took in Calcutta what is no doubt the ♂ of this species and which I think has not previously been noted. It resembles the ♀ in every way except that the tibiae are a little browner. The eyes are sub-contiguous immediately above the antennae, diverging thence upwards to the vertex, which is wholly occupied by the ocelli. The antennal style instead of being thick is quite filamentous.

Pachygaster Meig., 1803.

Illig. Mag., ii, 266.

Table of species.

Legs mostly black, tips of tibiae and the tarsi pale Long. 3 mm. *rufitarsis* Mcq.

Legs mostly yellowish or whitish.

1. Legs yellow, femora with apical $\frac{1}{2}$ brown Long. $2\frac{1}{2}$ mm. *limbipennis* V d. Wulp.

2. Legs brownish yellow. Femora and anterior tibiae blackish brown Long. 3 mm. *lativentris* V d. Wulp.

3. Legs quite white, tarsi tips faintly blackish Long. 2— $2\frac{1}{2}$ mm. *albipes* mihi sp. nov.

P. rufitarsis Mcq., 1846.

Dip. Ex. Supp., i, 57; pl. vi, 3.

♂ Pondicherry. Macquart Collection (now in the Paris Museum).

P. limbipennis V. d. Wulp, 1898.

Termés. Fuzet., xxi, 417.

2 ♂ ♂ Friedrich Wilhelmshafen (Papua).

P. lativentris V. d. Wulp, 1898; *l.c.*, 416.

1 ♀ Seleo, Berlinhafen (Papua).

P. albipes mihi sp. nov.

♀ Calcutta. Head and front shining black, a brilliant white streak each side of lower part of head. Antennæ and proboscis pale yellow. Thorax and abdomen shining black with short, sparse, silvery-grey hair, which is a little thicker and mixed with gold hairs on dorsum of thorax. Belly uniformly black. Legs uniformly dirty white, the tarsi tips faintly blackish. Wings quite clear, veins on foreborder pale yellowish. Halteres white. Described from 4 ♀ ♀ in the Indian Museum taken in Calcutta. Long. 2—2½ mm.

SUB-FAMILY III.—SARGINÆ.

Eyes in male not contiguous, approximate only, leaving a very narrow frontal space from vertex to antennæ.

Table of genera.

Antennal arista apical	<i>Chrysochlora</i> Latr.
Antennal arista dorsal.	
2nd antennal joint projecting over base of 3rd on inner side. Species non-metallic, generally more or less yellowish	<i>Ptecticus</i> Loew.
2nd antennal joint not projecting over 3rd. Species nearly always bright metallic blue or green	<i>Sargus</i> Fab.
Eyes in male absolutely contiguous.	
Eyes pubescent in both sexes	<i>Chloromyia</i> Dunc.
Eyes quite or practically bare in both sexes.	
3rd antennal joint 6-ringed	<i>Brachycara</i> Thoms.
3rd antennal joint 4-ringed	<i>Microchrysa</i> Loew.
<i>Salduba</i> , hitherto placed amongst the <i>Sarginæ</i> , I relegated to the <i>Pachygastrinæ</i> immediately I saw a figure of the wings; supported by Van der Wulp's authority for its affinity with <i>Tinda</i> .	

Microchrysa Loew, 1855.

Verh. Zool. Botan., v, 146.

Table of species.

Abdomen honey yellow.

Long. 5 mm. Post. fem. ringed *flaviventris* Wied. ♂

„ 3 „ Post. fem. pale. *bipars* Wlk.

Abdomen metallic ; never yellow.

Abdomen unicolorous.

Middle femora and tibiæ all pale

Abdomen bluish violet *flaviventris* Wied. ♀

Abdomen blackish, with purple reflections

Long. 4 mm. *affinis* Wied.

Middle femora and tibiæ indistinctly brown-ringed

Long. 3 mm. *gemma* Big.

Abdomen violet ; edges distinctly pale yellow

Long. 2½ mm. *calopus* Big.

M. flaviventris Wied.

(*Sargus*) Analec. Entom., 31, ♀

(*annulipes* Thoms., Eugenie Reise, 461.)

♂ East India. Type in Royal Museum, Copenhagen.

Osten Sacken records a ♂ from Java, and I took one ♂ at Bareilly, 1st September 1905, and if I have determined the ♀ rightly I have taken 3 specimens, respectively at Mussoorie, June 26 ; Meerut, July (13 to 19) ; and Lucknow, August 8 ; all during 1905. From Papua Van der Wulp records 2 ♂ ♂ 1 ♀

M. bipars Wlk., 1861.

(*Chrysomyia*) Pr. Linn. So., v, 273.

♂ Batjan. Walker says allied to *Sargus redhibens*, but I fail to see where.

M. affinis Weid.

(*Sargus*) Analec. Entom., 31.

♀ East India. Types in Copenhagen Museum and Wiedemann's Collection. Wiedemann (Auss. Zweif., ii, 41) suspects that this is the ♀ of *flaviventris*, and I am inclined to think so to.

M. gemma Big., 1879.

Ann. So. Ent. Fr. (1879), 231.

♀ Ceylon. Bigot Collection. Bigot emphasizes the very broad front in this species, and speaks of the middle femora and tibiæ being indistinctly brown-ringed, yet I would not be surprised to find it only the ♀ of *flaviventris* Wied.

M. calopus Big.

1 ♀ Margherita (Assam). I cannot trace the reference. (Incidentally I may add that Bigot described a *Chrysonotus calopus* ♀ in 1879 from Natal, but this is a different species.) Type in Indian Museum Collection. It is certainly a very distinct species.

In addition to the species mentioned I possess 3 specimens taken by myself at Mussoorie from June 18 to 26, 1905, in which the last antennal joint is entirely and quite black, the species other-

wise agreeing with *flaviventris*. All the other species have entirely yellow antennæ, so I believe them to be new, but refrain from describing them as such until I obtain a more extended experience of the Eastern species.

Brachycara Thoms., 1868.

Eugenie Freg. Reise, 460.

B. ventralis Thoms., 1868 ; *l.c.*, 641, pl. ix, 4.

"Isl. Rossi." Van der Wulp infers he means an isle of this name in the Andamans. Ross Island is the one on which Port Blair, the seat of government in the islands, is situated. Both sexes are recorded by Van der Wulp from Seleu, Berlinhafen (Papua).

Chloromyia Dunc., 1837.

Mag. Zool. Bot.

The only two oriental species are easily separated.

Legs blue, with shining hoary hair Long. 8 mm. *sapphirina* Wlk.

Legs pale yellow, apical half of anterior

legs black

Long. 8 mm. *stigmatica* V d. Wulp.

C. stigmatica V d. Wulp, 1898.

Termés. Fuzet., xxi, 411.

2 ♀ ♀ from Friedrich Wilhelmshafen (Papua).

C. sapphirina Wlk., 1849.

(*Chrysomyia*) List Dip. Brit. Museum, iii, 519.

♀ East Indies. British Museum Collection.

Sargus Fab., 1798.

Ent. Sys. Supp., 566.

Table of species.

A Large species 14 to 18 mm. long.

B Abdomen rusty red, with dorsal black-

ish stripe ; wings nearly clear

Long. 14 mm. *rufus* Dol.

BB Abdomen metallic—no stripe, wings

rather deeply blackish

1. Front piceous, legs tawny, streaked with pitch. Thorax blue-green, abdomen brilliant violet

Long. 18 mm. *gemmifer* Wlk.

2. Front chalybeate, supra-antennal triangle pale green. Thorax blue-green, abdomen metallic violet, stigma testaceous

Long. 15 mm. *pubescens* V.W

3. Front brilliant, metallic blue-green,
triangle yellow, stigma unicolorous,
thorax blue-green, abdomen copper,
violet reflections Long. 14 mm. *magnificus* Big.
- AA Moderate sized species 7 to 10 mm.
(*lætus* 12 mm.).
- C Wings very long, each 14 mm. long
Long. 12 mm. *longipennis* Wied.
- CC Wings normal.
- D Abdomen metallic blue-green, or there-
abouts. Base not whitish; legs nor-
mally long.
- E Legs all yellow (reddish yellow or yel-
lowish white), no black in them: at
most, tarsi tips darker or blackish.
- F Stigma dark brown.
- G Wing cinereous; whitish species. Disc of
thorax and scutellum tip purple Long. 10 mm. *inactus* Wlk.
- GG Wing clear, posterior half a little grey.
Thorax and scutellum brilliant gold-
green. Abdomen brilliant metallic
violet Long. 8 mm. *pallipes* Big.
- FF Stigma pale yellow ♂ eyes contiguous.
- H ♂ eyes contiguous Long. 8—10 mm. *metallinus* F.
- HH ♂ eyes not contiguous . Long. 7—9 mm. *mandarinus* Sch.
- EE Legs with distinct black rings, streaks,
or more or less black.
1. Femora with black streak above, near
tip Long. 7—8 mm. *redhibens* Wlk.
 2. Base of posterior femora black and
slender Long. 12 mm. *lætus* V. W.
 3. Femora and tibiæ partly piceous Long. 9 mm. *concisus* Wlk.
 4. Posterior half of posterior femora black
Long. 9 mm. *albopilosus* Meij.
 5. Anterior femora black at tip and posterior
tarsi at base. Posterior femora and
tibiæ black Long. 7 mm. *tibialis* Wlk.
 6. Posterior tibiæ with blackish basal half
Long. 9 mm. *mactans* Wlk.
 7. Legs mostly brown marked, not black
Long. (without head) 9 mm. *papuanus* Big.
- DD Abdomen purple, white at base, legs
extra long Long. 11 mm. *longipes* Wlk.
- AAA Small species.
Long. 5 mm. black shining Long. 5 mm. *debilis* Wlk.
Long. 3 mm. pale tawny shining Long. 3 mm. *inficitus* Wlk.
- S. rufus* Dol., 1858.
Nat. Tijds. Ned. Ind., xvii, 83.
Amboina. Rare, during dry season.

S. gemmifer Wlk., 1849.

List Dip. Brit. Mus., iii, 516.

Sylhet. Type in British Museum.

S. pubescens V. der Wulp, 1885.

Notes Leyden Mus., vii, 67.

♀ Gorontolo.

S. magnificus Big., 1879.

Ann. So. Ent. Fr. (1879), 222.

Assam. Bigot Collection. Head and middle legs (except femora) missing from the type when described. In spite of this, I feel sure that 4 ♂ in the Indian Museum from Tenasserim are of this species.

The three species above must be closely allied, but from the descriptions appear to be truly distinct.

S. longipennis Wied., 1824.

Analec. Entom., 31.

♂ Java. Type in Westermann's Collection. Also recorded from Malacca; and a ♂ named thus by Bigot exists in the Indian Museum, labelled Sadiya (Assam).

S. inactus Wlk., 1860.

Pr. Linn. So., iv, 97.

♀ Makassar (Celebes).

S. pallipes Big., 1879.

Ann. So. Ent. Fr. (1879), 222.

♀ Ceylon. Type in Bigot's Collection.

S. metallinus F., 1805.

Sys. Antl., 258.

(*S. formicæformis* Dol., Nat. Tijds. Ned. Ind., xiv, 403; pl. iii, 5.)

The commonest of all *Stratiomyidæ* throughout the Orient and a widely distributed species. Walker reports it from Borneo, India, Java and the Aru Islands; the Indian Museum possesses specimens from Katmandu (Nepal), Calcutta, Siliguri, Dehra Dun and Naini Tal, the dates varying from June to August. It has, outside of India, a much wider range of appearance, as it has fallen to my net at Rangoon (January), Singapore (17th February 1906), Shanghai and Calcutta (both in May), Mussoorie (June), Meerut (July), and Lucknow (August and September).

S. mandarinus Sch., 1868.

Reise der Novara, 62.

♂ One example. Hong Kong, allied to the European *flavipes*. Schiner says the eyes quite touch, which may require it a generic separation, as in *Sargus* the eyes are approximate, not contiguous.

S. redhibens Wlk., 1860.

Pr. Linn. So., iv, 97.

♀ Makassar (Celebes). He mentions a variety with green thorax and purple vertex, and thinks it may be a local variety of *metallinus* F., but as he mentions dark markings on its hind legs, it could hardly be *metallinus*. I took one ♂ at Rangoon between 23rd December 1904 and 3rd January 1905, also a ♀ at Singapore, 17th February 1906, both certainly this species; but the posterior tibiae have a black streak at the base and not at the tip.

S. latus V der Wulp, 1885.

Notes Leyden Mus., vii, 66.

♂ Sumatra. The author notes it near *mactans* Wlk., and would have considered it the male of that species but for the pattern and coloration of the abdomen.

S. concisus Wlk., 1861.

Pr. Linn. So., v, 273.

♂ Batjan, near *redhibens* Wlk.

S. albopilosus Meij.

Nova Guinea Res. L'Exp. Sci. Neerl. N. Guinea, Dipt., 73.

♂ Mañokwari (Papua).

S. tibialis Wlk., 1861.

Pr. Linn. So., v, 273.

♂ Batjan, Gilolo. Near *redhibens* Wlk.

S. mactans Wlk., 1860.

Pr. Linn. So., iv, 97.

♂ Makassar (Celebes), Amboina, Borneo, Ceylon. Osten Sacken saw three from Kandari (Celebes) taken April 1874, and one from Ternate, and pertinently adds: "There may be several conflicting species here, or else they vary in the extent of black on the legs, and in the colour of the stigma."

I think it probable that several of the species in this group may prove varieties, but described as most of them are, from single specimens, and these types not being available for examination in India, I cannot further our knowledge of the group.

Three ♂♂ in the Indian Museum Collection from Nepal (4,500 feet) taken in October, agree pretty closely with Walker's description, as does a ♂ in the same collection captured by Dr. Annandale at Bhim Tal, 19th to 22nd September 1906, also at an altitude of 4,500 feet. From this height to the plains and so low a latitude as Singapore and the East India Islands would be by no means an excessive range for a Dipteron.

Van der Wulp mentions 2 ♂♂ from Papua.

S. papuanus Big., 1879.

Ann. Soc. Ent. Fr. (1879), 223.

♀ Bigot Collection.

S. longipes Wlk., 1861.

Pr. Linn. So., v, 232.

♂ Dorey (Papua). A male from Erima (Astrolabe Bay) Papua, is recorded by Van der Wulp.

S. debilis Wlk., 1861; *l.c.*, v, 274.

♂ Batjan. Near *redhibens* Wlk.

S. inficitus Wlk., 1861; *l.c.*, v, 274.

♂ Batjan.

Ptecticus Loew., 1855.

Verh. Zool. Bot., v, 142.

Table of species.

A Black species; wings blackish (slightly tawny in front in *tenebrifer*).

Long. 18 mm.

remeans Wlk.

„ 14 mm.

illucens Sch.

„ 10 to 12 mm.

tenebrifer Wlk.

AA Yellow species (sometimes much marked with black).

B Wing with basal half yellow tawny, remainder blackish or grey.

Posterior femora black

Long. about 15-16 mm. *rufescens* V. d. Wulp.

Posterior femora reddish yellow.

1. Disc of thorax ferruginous, 3 indistinct darker lines. Abdomen with shining black dorsal bands. Posterior tibiae in ♂ with brown band

Long. 14-15 mm. *aurifer* Wlk.

2. Male genitalia black. 4th abdominal segment with a very large brown spot. 5th all blackish. Thorax all tawny, unmarked.

Long. 15 mm. *apicalis* Lw.

3. ♂ genitalia black. 2nd to 6th abdominal segments, with broad black cross bands reaching the side border. Posterior tibiæ blackish brown Long. 16 mm. *cingulatus* Lw.
4. ♂ genitalia black; disc of thorax ferruginous. Body reddish yellow. Last abdominal segment black. Apical half of posterior tibiæ brown Long. 12-14 mm. *leoninus* Rond.
5. ♂ genitalia fulvous, very large and complex. Long. 15-16 mm. *Wulpii* V d. W nom. nov.

BB Wings with distinct black or blackish parts :—not yellow.

Long. 18 mm.

Abdomen all testaceous 18 *repensans* Wlk.

Abdominal last 2 segments black 18 *tricolor* Meij.

Long. 8 to 12 mm.

All tibiæ and tarsi blackish, abdomen subclavate, lengthened 8 *quadrifasciatus* Wlk.

Only posterior tibiæ black marked. Abdomen normal.

1 Posterior tibiæ and tarsi all black. Abdomen with a brown spot on segments 2 to 5. 10 *rogans* Wlk.

2. Posterior tibiæ black, tawny marked apically. Abdomen with 4 broad, abbreviated piceous bands 12 *complens* Wlk.

3. Posterior tibiæ black, posterior tarsi whitish. Thorax indistinctly striped. Abdomen with abbreviated dilated black band on each segment 12 *tarsalis* Wlk.

BBB Wings nearly or quite clear, or pale grey. (Anterior margin yellowish in *ferrugineus* Dol.)

Anterior margin of wing yellow. Long. 10 mm. *ferrugineus* Dol.

Anterior margin of wing not yellow.

Thorax with 3 stripes, species partly black

Long. 11-12 mm. *brevipennis* R.

Thorax unstriped, species mostly yellow.

Abdomen black above with narrow lighter bands. Long. 8 mm. *australis* Sch.

Abdomen tawny with broad black bands.

Posterior femora striped

with black Long. 10 mm. *latifascia* Wlk.

Posterior femora testa-

ceous tawny Long. 10 mm. *doleschalli* Big.

Pt. remeans Wlk., 1860.

(*Sargus*) Pr. Linn. So., iv, 96.

♀ Makassar (Celebes) ♀ “ allied to *S. tenebrifer* ” Walker says. Head wanting in the type. Osten Sacken notes 14 ♂ ♂ and 1 ♀ from

Kandari (Celebes) taken April 1874, but is hardly positive as to identity. Walker describes a perfect specimen of what he takes to be the male, but selects the headless female as the type!

Pt. illucens Sch., 1868.

Reise Novara, 65.

One example; sex? Hong Kong. A large handsome species, I took a ♂ ♀ *in cop.* and a separate ♀ at Yokohama, 21st to 26th May 1906, thus fixing the sexes and species. Schiner queried the sex of his type specimen. I think it was a ♂, because he mentions "front broad behind" and this is *apparently* the case (but not really so, proportionately) in this sex, owing to the eyes almost touching in front just above the frontal raised triangle. The front in the ♀ is slightly but distinctly wider. In the ♀ taken *in cop.*, the white 2nd translucent abdominal segment is much obscured. Van der Wulp mentions the occurrence of the species in Japan, from which land it also figures in the recent Catalogue of Palæarctic Diptera.

Pt. tenebrifer Wlk., 1849.

(*Sargus*) List Dip. Brit. Mus., iii, 517.

♀ China. Brit. Mus. Coll.

Pt. rufescens V d. Wulp, 1868.

(*Sargus*) Tijd. Ent., xi, 104; pl. iii, 7 to 9.

By Van der Wulp's remark referring to his *apicalis* "close to *rufescens* V. W." I have presumed this species to be of the same size, and therefore enter it in my table as 15 to 16 mm.

Pt. aurifer Wlk., 1854.

(*Sargus*) List Dip. Brit. Mus., v, 96.

♂ ♀ India. N. China. Walker compares it to *S. cuprarius* L., differing from that species in venation.

Pt. apicalis Lw., 1855.

Verh. Zool. Bot., v, 142; pl. x, 3—4.

(*Sargus luridus* Wlk.; Pr. Linn. So., i, 8.)

♂ Pulo Penang. Type in Westermann's Coll.

There are six more or less closely allied species in this group, and I have had some difficulty in understanding them. All seem distinguished from all other species in the genus by the basal half of the wing being brightly yellow, and the remaining half blackish—commencing at or just beyond the discal cell to the tip of the wing. Two species (*aurifer* Wlk., and *leoninus* R.) are said to have the disc of the thorax ferruginous, that is, darker than the general reddish yellow colour of the whole body—the former bearing, in addition,

traces of three longitudinal lines. In *apicalis* Lw., the spot on the 4th abdominal segment is large, distinct and separate from the all black 5th segment. In a few specimens I captured in August 1895 at Mussoorie, which seem, almost undoubtedly, this species, I find faint traces of a blackish dorsal band on the 2nd and 3rd segments, and the posterior tibiæ are black at the tip and not at the base. A smaller specimen similarly marked, I refer to this species, although it answers fairly to *leoninus* Rond., except that the disc of the thorax is not darker, nor are the tarsi tips blackish. However, in size (12 mm.) and the apical black posterior tibiæ, it agrees with *leoninus* better than with *apicalis*.

Apicalis V der Wulp (for which, *apicalis* being preoccupied by Loew, I take the liberty and pleasure in proposing the name of its illustrious author *Wulpii*) stands out from *apicalis* Lw., *cingulatus* Lw., and *leoninus* Rond., by its very prominent and complicated *fulvous* genitals, which are black in the other three species. In *cingulatus* the abdominal bands are broad, and transverse, extending to the border; in *aurifer* the band is *dorsal*; in *apicalis* Lw., the 4th segment is occupied by a large, black, oval, distinct spot, whilst in *leoninus* the whole last segment only of the abdomen is black—wherein it differs from *Wulpii*, which has the last two or three segments purplish brown. These various markings, if consistent would sufficiently separate the species—and in the only two species I recognise with certainty, from actual specimens, the consistency seems sufficiently present. These are the 4 or 5 *apicalis* Lw. in my own collection and 5 or 6 damaged *Wulpii* (one specimen named by Bigot) in the Indian Museum.

Pt. cingulatus Lw., 1855.

Verh. Zool. Bot., v, 143.

♂ Penang. Westermann's Coll.

Pt. leoninus Rond., 1875.

(*Sargus*) Ann. Mus. Gen., vii, 454.

♂ Locality not given.

Pt. wulpii nom. nov.

(*Pt. apicalis* V d. Wulp nom bis lectum.)

Notes Leyden Mus., vii, 62, 1885.

♂ Sumatra, Borneo. Near *leoninus* Rond., but genitalia *fulvous*, conspicuous and complex instead of black.

The Indian Museum specimens (*vide* note on *Pt. apicalis* Lw.) are from Margherita (Upper Assam).

Pt. repensans Wlk., 1860.

(*Sargus*) Pr. Linn. So., iv, 96.

♂ Makassar (Celebes). Walker says, allied to *S. aurifer* Wlk.

Osten Sacken in reporting 9 ♂ ♂ and a ♀ from Kandari (Celebes), April 1874, adds, "Walker should not have called the wing cinereous — otherwise, the description is recognisable."

Pt. tricolor Meij., 1904.

Bijd. Dierk., xviii, 95 ; pl. viii, 11.

1 ♂ Sukabumi (Java). The author adds "V der Wulp descr." The coloured illustrations in this paper by Meijere are most excellent.

Pt. quadrifasciatus Wlk., 1861.

(*Sargus*) Pr. Linn. So., v, 146.

♂ Amboina, Batjan. The author adds further characters and a description of the ♀ in his article on Batjan Diptera. Osten Sacken records 1 ♂ from Dorei Hum (Papua), February 1875, and, suspecting variability in the black on the abdomen, places here also a ♀ from Ternate.

Pt. rogans Wlk., 1859.

(*Sargus*) Pr. Linn. So., iii, 81.

♀ Aru Isles. Type in British Museum much damaged. Osten Sacken saw a ♂ from Dorei Hum (Papua) marked February 1875 and adds that *ferrugineus* Dol. is near it, but has no brown spots on the abdomen, nor brown cloud at wing tip. *Pt. doleschalli* Big. from Mysol is probably this species. Osten Sacken has seen a specimen from the Philippines named by Walker as this species, I took a few ♀ ♀ at Lucknow, 7th September 1905, which agree, except that the posterior tarsi are yellow, not black, but in one ♂ they are blackish at the base.

Pt. complens Wlk., 1859.

(*Sargus*) Pr. Linn. So., iii, 81.

♀ Aru Isles.

Pt. tarsalis Wlk., 1861.

(*Sargus*) Pr. Linn. So., v, 274.

♀ Batjan, Gilolo.

Pt. ferrugineus Dol., 1858.

(*Sargus*) Nat. Tijd. Ned. Ind., xvii, 83.

Amboina. Rare during dry season. Van der Wulp records 5 ♀ ♀ from Papua allied to *rogans* Wlk., *rufus* Dol., and *latifascia* Wlk.

Pt. brevipennis Rond, 1875.

(*Sargus*) Ann. Mus. Gen., vii, 454.

Pt. australis Sch., 1868.

Reise Novara, 65.

One ♀ Fani Is. (Nicobars). In the Indian Museum 2 ♂ ♂ and 2 ♀ ♀ from Assam (Sadiya and Margherita) and also from Dehra Dun, the species determined by Bigot.

Pt. latifascia Wlk., 1857.

(*Sargus*) Pr. Linn. So., i, 110.

♂ Java, Sumatra.

Pt. doleschalli Big., 1879.

Ann. So. Ent. Fr. (1879), 231.

♂ Mysol. Bigot Coll. May be the same species as *rogans* Wlk., according to Osten Sacken in Ann. Mus. Genova, xvi, 416. Van der Wulp mentions 4 ♂ ♂ from Tamara and Berlinhafen (Papua).

Chrysochlora Latr., 1825.

Fam. Nat. du regne anim., 494.

The two species recorded from the East vary enormously in size, that of Doleschall being only 3 mm. in length, whilst *C. baccoides* is 17.

Ch. vitripennis Dol., 1856.

Nat. Tijds. Ned. Ind., x, 408 ; pl. xi, 2.

Djokjokarta (Java).

Ch. baccoides Rond., 1875.

Ann. Mus. Gen., vii, 454.

♀ Borneo.

SUB-FAMILY IV.—CLITELLARINÆ.

Table of genera.

- | | | |
|----|----------------------------------|---------------------------|
| A | Thorax with a strong side spine. | |
| | Antennal style thickly pilose | <i>Negritomyia</i> B g. |
| | Antennal style bare | <i>Ephippiomyia</i> Latr. |
| AA | Thorax with no side spine. | |
| | Scutellum very gibbous, abdomen | |
| | always shorter than thorax. | |
| | Scutellum unspined. | |
| | Abdomen little broader than | |
| | long, much shorter than | |

- thorax ; antennæ very short *Saruga* Wlk.
 Abdomen much broader but not longer than thorax ; antennæ nearly as long as thorax *Aulana* Wlk.
 Scutellum 2-spined *Musama* Wlk.
 Scutellum normal, abdomen shorter or longer than thorax.
 1. Scutellum bare.
 Face produced into a snout *Nemotelus* Geoff.
 Face not so produced.
 Abdomen elliptical, elongated a little .. *Lasiopa* Brullé.
 Abdomen globose, very much broader, and a little longer than thorax *Ruba* Wlk.
 2. Scutellum with 2 spines.
 Spines very distinct, abdomen short, round, very arched *Oxycera* Meig.
 Spines often small or indistinct, abdomen elongated, less arched *Clitellaria* Meig.
 3. Scutellum 4-spined *Trichochæta* Big.

Negritomyia Big., 1879.

Ann. So. Ent. Fr. (1879), 190.

The species are closely allied in markings, coloration and size ; and a rough table for their identification is all that can be drawn up in the absence of specimens of any of the species.

1. Femora black, base pale : large brown spot above discal cell. Long. 10 mm. *maculipennis* Macq.
2. Legs luteous ; wings cinereous—costa luteous Long. 12 mm. *festinans* Wlk.
3. Legs pale tawny testaceous ; wing brownish, base clearer Long. 11 mm. *albitarsis* Big.
4. Legs brown, base of femora pale, wing nearly clear, brown stigma, diffused band near tip, reddish spot on lower edge of wing Long. 9 mm. *consobrina* Big.

N. maculipennis Macq., 1851.

Dipt. Exot. Supp. 4, 54.

♂ ♀ Manila, Ternate, Papua, near *Clitellaria heminopla* Wied. Type in Paris Museum. In his "Enumeration" Osten Sacken records 1 ♂ and 4 ♀ ♀ from Ramoi and Dorei Hum (Papua) taken February 1875, and from Ternate ; also 12 ♂ ♂ ♀ ♀ from Manila,

the abdomen in these latter being more bluish than in the East Indian Islands specimens. Meijere announces a ♀ from Mañokwari (Papua), taken May 2nd. In 1880 Osten Sacken queried "*Odonatomyia cinerea*" Dol. (= *Ephippiomyia* id) from Amboina as a synonym of this species, but Van der Wulp keeps them generically divided in his Catalogue.

N. festinans Wlk., 1860.

Pr. Linn. So., iv, 95.

(*Engonia aurata* Sch.)

♂ Makassar, Amboina. The author also adds what he considers the ♀ Osten Sacken records 3 ♂ ♂ 1 ♀ from Kandari, April 1874.

N. albitarsis Big., 1879.

Ann. So. Ent. Fr. (1879), 207.

♀ Papua. Bigot Coll. Also known from Australia.

N. consobrina Big., 1879; *l.c.*, 208.

♂ Papua. Bigot Coll.

***Ephippiomyia* Latr., 1809.**

Gen. Crust. Ins., iv, 276.

Emended from *Ephippium* Latr. by Bezzi, 1902, Zeits. Hym. Dip., ii, 191.

Ephippium being preoccupied by Bolten in Mollusca 1798, the change of name is merely an emendation. I believe no change of generic characters attaches to *Ephippiomyia*, but I have not seen the work. I mention this because the new Palæarctic Catalogue attributes the genus to Bezzi, as though newly created.

Table of species.

Rather large sized species 10 to 14 mm.

Femora black Long. 12-14 mm. *bilineatum* F.

Femora livid, except towards tips Long. 10 mm. *responsale* Wlk.

Moderate sized species, 7 mm.

Thorax with two stripes of gilded tomentum

Long. 7 mm. *gavasum* Wlk.

Thorax with two indistinct whitish stripes

Long. 7 mm. *cinereum* Dol.

Quite small species

Long. 4 mm. *nigerrimum* Dol.

E. bilineatum F., 1805.

(*Stratiomys*) Sys. Antl., 79.

Clitellaria bivittata Wied., Auss., ii, 46.

Ephippium augustum Macq., Dipt., i, 252.

Raphiocera spinithorax Macq., Dip. Ex. Sup., 3, 17; pl. i, 7.

Clitellaria tenebrica Wlk.; List. Dip. Brit. Mus., vii, 522.

Ephippium spinigerum Dol., Nat. Tijd. Ned. Ind., x, 407.

Negritomyia bilineata V d. Wulp, Notes Leyd. Mus., vii, 59.

Reported to be common in Java and to occur in Amboina. I did not come across it although collecting in Java in five localities. Also occurs in Japan.

Two specimens from Tenasserim are in the Indian Museum, of which one, with contiguous eyes, is certainly a ♂. The other has the eyes very slightly but distinctly apart. It is not a ♀, because in this genus the eyes in the ♀ should be widely apart, yet the specimen is undoubtedly of the same species as the first one.

Another specimen also from Tenasserim in the Indian Museum Collection varies in nothing but size, and is a fine *Ephippiomyia* with absolutely contiguous eyes, whilst an interesting fourth specimen (unfortunately minus its antennæ), likewise from Tenasserim, appears to belong to the same genus, but has no side spines. The abdomen is much wider than the thorax as in the typical European species *thoracica* Latr., whereas in *bilineata* it is ovately elongated, and this latter species does not strike one at first as an *Ephippiomyia* at all. Without thoracic spines (of which there is no trace whatever) the Tenasserim specimen becomes an *Oxycera*, but its size (7 mm.), general facies, and black colour approximates it more to the present genus. Regarding the species with linear abdomens not wider than the thorax, I think a separate genus should be established for them. This would include *bilineata* F., and *Ephippiomyia* would be reserved for species in which the abdomen is much broader than the thorax, also comparatively much shorter, thicker and more convex.

E. responsale Wlk., 1865.

(*Clitellaria*) Pr. Linn. So., viii, 106.

♂ Papua. Allied to *bivittata*, but with broader antennæ.

E. gavasum Wlk., 1860.

(*Clitellaria*) Pr. Linn. So. iv., 95.

♂ Makassar (Celebes). The author also describes what he thinks is the ♀

E. cinereum Dol., 1857.

(*Clitellaria*) Nat. Tijd. Ned., xiv, 403.

Amboina. In Van der Wulp's Catalogue, he doubts if an *Ephippiomyia*, and questions the form of its antennæ.

E. nigerrimum Dol., 1858.

Nat. Tijds. Ned. Ind., xvii, 81.

Amboina. A mountain species taken in April, no sex mentioned.

Saruga Wlk., 1860.

Pr. Linn. So., iv, 101.

S. conifera Wlk., 1860; *l.c.*, 103.

♂ Makassar (Celebes).

Aulana Wlk., 1864.

Pr. Linn. So., vii, 204.

A. confirmata Wlk.; *l.c.*, 204.

♀ Mysol.

Musama Wlk., 1864.

Pr. Linn. So., vii, 205.

M. paupera Wlk., 1864; *l.c.*, 205.

♀ Mysol. In Carl Semper's collection of Diptera from the Philippines, reported on by Osten Sacken in 1882, was a specimen identified as *paupera* by Walker himself, but Osten Sacken finds it disagrees with the description in several points.

Nemotelus Geoff., 1764.

Hist. d. Insects, ii, 542.

N. albiventris Thoms., 1868.

♂ Manila.

Lasiopa Brulle', 1832.

Exped. à Morée, iii, 307.

Table of species.

Moderate sized species

Long. 10 mm. *villosa* F.,
var. nov. *himalayensis* mihi.

Small species 4 to 6 mm.

Antennæ tawny.

Long. 6 mm.

radians Wlk.

„ 4 mm.

detracta Wlk.

Antennæ black

Long. 4 mm. *infera* Wlk.

L. villosa F., var. nov. *himalayensis* mihi.

At Mussoorie in May 1905 (12th and 31st) I took 3 ♀ ♀ which hardly differ from the typical form of this European species. The

abdominal spots are slightly narrower and not quite curved upwards so much at the inner ends.

L. radians Wlk., 1857.

(*Cyclogaster*) Pr. Linn. So., i, 7.

♀ Singapore.

L. detracta Wlk., 1857.

(*Cyclogaster* id) l.c., 108.

♀ Sarawak.

L. infera Wlk., 1857 ; l.c. 107.

♀ Sarawak.

Ruba Wlk., 1860.

Pr. Linn. So., iv, 100.

Walker gives his description of the ♀, but the only species mentioned is a ♂!

Body wholly testaceous Long. 8 mm. *inflata* Wlk.

Abdomen black, with whitish pubescence Long. 6 mm. *opponens* Wlk.

R. inflata Wlk., 1860.

Pr. Linn. So., iv, 101.

Dr. Brauer in Denks. Kais. Ac. Wiss. Wien., xlv, 77, thinks that Schiner's *Thylacosoma amboinense* from that island may be a synonym.

A specimen in the Indian Museum Collection from Kohima (Assam) agrees rather well with this species, but is rather larger (10 mm.) and shews abnormal expanse of wing (12 mm. from centre of thorax to tip of wing—the other wing is missing, also the antennæ). In other respects there are differences; it may be a new species.

R. opponens Wlk., 1865.

Pr. Linn. So., viii, 107.

♂ Papua. Van der Wulp also records it from Friedrich Wilhelmshafen in Papua.

Oxycera Meig., 1803.

Illig. Mag., ii, 265.

O. manens Wlk., 1860.

Pr. Linn. So., iv, 96.

♂ ♀ Makassar (Celebes).

Oxycera indica mihi, sp. nov.

♀ N.W India. Long. $4\frac{1}{2}$ mm. Head entirely lemon yellow, except a rather wide black band on the vertex reaching from eye to eye. Four small black spots arranged in the form of a square, all placed at an equal distance from the base of the antennæ, which latter are tawny brown, darker at the tip. Lower part of head yellow behind, a moderately wide yellow band encircling the head—passing behind the vertex. The whole head, including the eyes, sparsely pubescent with short pale yellow hairs. Proboscis prominent, black. Thorax æneous black above, with short, rather close yellowish white hair; underside black. Sides lemon yellow from anterior corners of dorsum to beyond root of wings. Scutellum lemon yellow, base narrowly black; two very small spines. Abdomen pale yellow, with very short yellowish white hairs and black marked as follows: a large diamond-shaped spot spread over the centre of the 1st and 2nd segments, a minute spot on each side of the base of the 2nd segment; rather more than the basal half of 3rd, 4th and 5th segments black,—these bands being joined to one another in their centres and the upper one to the large diamond spot on 2nd segment. Belly yellow. Legs lemon yellow, pubescence yellow, minute; a black ring on all the femora and the posterior tibiæ. Wings colourless, veins pale yellow on anterior portion. Halteres pale yellow.

Described from 2 ♀ ♀ in perfect condition in the Indian Museum Collection. Type from Bareilly, United Provinces (15th to 22nd March 1907); the second specimen from Rampur Chaka (23rd to 31st January 1907). In the type the upper pair of spots on the front are larger than the lower ones; in the other example, all four are of uniform size. A larger specimen taken at Calcutta (June 22nd) has four complete black abdominal bands, the first being basal.

This species differs from *O. manens* Wlk. by the latter having the abdomen entirely black.

Clitellaria Meig., 1803.

Illig. Mag., ii, 265.

Table of species.

Antennæ black.

Thorax with three green stripes . Long. 5—7 mm. *flaviceps* Wlk.

Thorax “ with a band and stripe of grey tomentum ” Long. 10 mm. *notabilis* Wlk.

Antennæ tawny red.

Thorax with yellowish hairs on dorsum Long. 7 mm. *heminopla* Wied.

Thorax with 3 interrupted downy bands Long. 8 mm. *varia* Wlk.

C. flaviceps Wlk., 1857.

Pr. Linn. So., i, 7.

♀ Singapore, Sarawak.

C. notabilis Wlk., 1857.

Pr. Linn. So., i, 108.

♀ Borneo.

C. heminopla Wied.

Zool. Mag., iii, 30.

♂ ♀ Tranquebar.

Not uncommon in India. I took several of each sex at Meerut, 25th April 1905; and odd specimens at Calcutta, 18th to 24th November 1905; Jhansi, 31st March 1905; Jullundur, 5th May 1905; and Lucknow, 7th September 1905. The Indian Museum possesses it from Karachi and Calcutta.

Two ♂♂ I took at Meerut, 13th to 19th July 1905, have the femora pale at the base.

C. varia Wlk., 1854.

List Dipt. Br. Mus., v, 63.

♂ Java, Sarawak, Malacca.

Trichochæta Big., 1879.

Bull. So. Ent. Fr., 26; Annales (1879), p. 190
(published first in pt. 3, p. 6, 1878).

T. nemoteloides Big., 1879; *l.c.*, 191.

♀ Ternate. Bigot Coll.

SUB-FAMILY V.—HERMETINÆ.

Table of genera.

Scutellum unspined.

Abdomen elongated, not linear.

Head produced horizontally, antennæ long, almost filiform, horizontal

Cænocephalus V. d. Wulp.

Head normally vertical.

Antennæ apparently of 3 distinct joints, not of uniform width; last joint of 8 divisions

Hermetia Latr.

Antennæ apparently filiform, not of uniform width; last joint of at most 6 divisions.

Eudmeta Wied.

Abdomen linear, contracted at base

Massicyta Wlk.

Scutellum 2-spined, antennæ filiform.

Discal cell elongated, and attenuated posteriorly *Ampsalis* Wlk.

Discal cell (presumably) normal.

Abdomen elongated, as wide as thorax *Campeprosopa* Macq.

Abdomen elongate-elliptical; attenuated at base, a little broader and longer than thorax *Tracana* Wlk.

Cænocephalus V. der Wulp, 1898,

Termés. Fuzet., xxi, 413.

Van der Wulp in separating *Salduba melanaria* Wlk., from the rest of the genus and creating the above genus for it, recognised at once that the venation placed this species in a different sub-family supplemented by a most unusual form of head. Moreover, he recognised *Salduba*'s true position (*Pachygastrinæ* sub-family) by his remarks as to its affinities with *Tinda*.

C. melanarius Wlk., 1861.

(*Salduba*) Pr. Linn. So., v, 271.

♂ Batjan.

Hermetia Latr., 1805,

Hist. Nat. Crust. Ins., xiv, 238.

Table of species.

Scutellum unspined.

Legs all or mainly black or blackish brown.

Wings clear, tip a little darker, stigma black brown Long. 14 mm. *fenestrata* Meij.

Wings blackish.

Long. 10 to 12 mm.

Posterior borders of abdominal segment bright yellow. Long. 10-12 mm. *cerioides* Wlk.

Posterior borders of abdominal segments whitish. Long. 10½ mm. *albitarsis* V. d. Wulp.

Long. 14 to 16 mm.

Thorax with 3 indistinct cinereous stripes Long. 14-16 mm. *remittens* Wlk.

Thorax with pale yellow marks Long. 14 mm. *laglaizei* Big.

Legs yellow or reddish

Wings blackish. Thorax with 3 indistinct gold stripes. Long. 12 mm. *rufiventris* Wlk.

Wings clear. Thorax with 1 in-
 distinct white line Long. 13 mm. *læta* Meij.
 Scutellum 2-spined Long. 17-19 mm. *armata* V. d. Wulp.

H. fenestrata, Meij., 1904.

Bijd. Dierk., xviii, 93 ; pl. viii, 9.

1 ♂ Palembang.

H. cerioides Wlk., 1859.

(*Massicyta*) Pr. Linn. So., iii, 78.

H. batjanensis V. d. Wulp, 1885 ; Notes Leyd. Mus., vii, 67.

♀ Moluccas, Aru Isles, Gilolo, Batjan, South Halmaheira.

Walker described this under his genus *Massicyta*, distinguished from *Hermetia* by a subpetiolate abdomen and more elongated and linear body, but I agree with Van der Wulp in keeping it in *Hermetia*, a genus in which all degrees of slight contractions of the first abdominal segments occur. *Massicyta* must be reserved for distinctly subpetiolated species such as *bicolor* Wlk.

A series of ♀ ♀ exists in the Indian Museum Collection, but they bear no data. Van der Wulp had 2 ♀ ♀ from Seles, Astrolabe Bay (Papua).

H. albitarsis V. der Wulp, 1898.

Termés. Fuzet., xxi, 419.

♀ Friedrich Wilhelmshafen (Papua).

H. remittens Wlk., 1860.

Pr. Linn. So., iv, 94.

♀ Makassar (Celebes).

H. laglaizei Big., 1887.

Ann. So. Ent. Fr. (1887), 21.

♀ Amberbek (Papua). Type much damaged.

H. rufiventris Wlk., 1861.

Pr. Linn. So., v, 145.

♀ Amboina.

H. læta Meij., 1904.

Bijd. Dierk., xviii, 93 ; pl. viii, 8.

♀ Bengal, near *cerioides*. This is true, for, from the excellent plate I immediately recognised one ♀ which I had eliminated from the series of ♀ *cerioides* in the Indian Museum as distinct.

H. armata V. d. Wulp, 1885.

Notes Leyd. Mus., vii, 68.

♀ Morotai. In possessing two spines on the scutellum this species differs from all others in the genus, and, I think, entitles it to generic rank.

Massicyta Wlk., 1857.

Pr. Linn. So., i, 8.

There are only two oriental species, the former 12—14 mm. in length, the latter 22.

M. bicolor Wlk., 1857.

Pr. Linn. So., i, 8 ; pl. i, 1.

♀ Singapore. The plate given is excellent.

M. inflata Wlk., 1859.

Pr. Linn. So., iii, 78.

♀ Aru Isles.

Eudmeta Wied., 1830.

Ausser. Zweifl., ii, 43.

Table of species.

Large species Long. 14 mm. *brunnea* Meij.

Smaller species.

Black species with green markings. Long. 9 mm. *marginata* F.

Ferruginous luteous species Long. 7 mm. *flavida* Big.

E. brunnea Meij., 1904.

Bijd. Dierk., xviii, 94 ; pl. viii, 10.

♂ ♀ Darjeeling. One ♀ from Kohima, Assam, answers well to Meijere's description.

E. marginata F., 1805.

Sys. Antl., 63. (*Hermetia*.)

(*Hermetia cingulata*) Guer. Voy. Coquille.

(*Toxocera limbiventris*) Macq. Dip. Ex. Supp. 4, 45 ; pl. v, 3.

♂ India, Singapore, Sumatra, Java, Amboina. Macquart in Dipt. Exot. Supp. iii, 176, describes the ♀, pl. i, 9 (figures of head and wing).

In the Indian Museum a ♀ example, without data, is probably this species.

Campeprosopa Macq., 1851.

Dipt. Exot. Supp. 4, 46.

Of the two oriental species, *flavipes* has a black thorax, with lighter coloured pile, whilst *munda* possesses a metallic blue-green thorax.

C. flavipes Macq., 1851.

Dipt. Exot. Supp. 4, 46 ; pl. v, 4.

♀ Java. Long. 12 mm. Bigot Coll.

C. munda Os. Sack., 1880.

Ann. Mus. Gen., xvi, 409.

♂ Sumatra. Long. 8—9 mm.

Ampsalis Wlk., 1860.

Pr. Linn. So., iv, 98.

A. geniata Wlk., 1860 ; l.c., 99.

♀ Makessar (Celebes).

Tracana Wlk., 1860.

Pr. Linn. So., iv, 99.

T. iterabilis Wlk., 1860 ; l.c., 99.

♂ ♀ Makessar.

The descriptions of *Campeprosopa*, *Ampsalis* and *Tracana* all read so much alike to me that, I believe, they represent but a single genus. Walker calls the discal cell in *Ampsalis* "elongated and attenuated exteriorly," which is not mentioned in the other genera ; and he differs his *Tracana* from *Ampsalis* by the abdomen being "elongate, elliptical, attenuated at base, a little broader and longer than thorax" compared with "abdomen elliptical, a little broader but not longer than thorax."

Following Van der Wulp I have retained the genera separately, and hope that a visit to England a little later on will enable me to settle the question by an examination of all three types.

SUB-FAMILY VI.—STRATIOMYINÆ.

Table of genera.

First antennal joint 3 to 4 times as long as	
2nd	<i>Stratiomyia</i> Geoff.
First antennal joint at most twice as long	
as 2nd.	<i>Odontomyia</i> Meig.
First antennal joint shorter than 2nd	<i>Euceromyia</i> Big.

Stratiomyia Geoff., 1764.

(Stratiomys) Hist. d. Ins., ii, 475.

Table of species.

- Antennæ unusually long—1st joint six times
length of 2nd Long. 10-14 mm. *apicalis* Wlk.
- Antennæ of moderate length.
Legs principally black.
Abdomen tawny, with broad black
dilated dorsal band. 1st two
antennal joints red Long. 12 mm. *parallela* Wlk.
- Abdomen black—no dorsal band;
pale marks on posterior borders of
segments—near sides. Antennæ
black Long. 10-12 mm. *barca* Wlk.
- Legs principally yellow.
Abdomen tawny. Thorax 2-striped,
antennæ pale Long. 8 mm. *inanimis* Wlk.
- Abdomen black.
Thorax 4 gold striped, base of
antennæ pale Long. 8 mm. *confertissima* Wlk.
- Thorax unstriped, densely pu-
bescent. A n t e n n æ
black. Long. 15 mm. *flavoscutellata* V d. Wulp.

S. apicalis Wlk., 1854.

List. Dip. Brit. Mus., v, 53.

♀ Shanghai.

S. parallela Wlk., 1865.

Pr. Linn. So., viii, 107.

♂ Papua.

S. barca Wlk., 1849.

List. Dip. Brit. Mus., iii, 530.

♂ China. I took a ♂ each at Hankow, 22nd April 1906, and
Shanghai, 9th May 1906.

S. inanimis Wlk., 1856.

Tr. Entom. So. (new ser.), iv, 121.

China.

S. confertissima Wlk., 1859.

Pr. Linn. So., iii, 79.

♀ Aru Isles.

S. flavoscutellata V. d. Wulp, 1885.

Notes Leyd. Mus., vii, 60.

♂ Java.

The genus is poorly represented in the East apparently. Three out of the six known species come from semi-Palæarctic regions. I have never taken a specimen myself in the East proper, nor is there one in the Indian Museum, nor do other authors mention any species except the three original descriptions mentioned here. I mention this because *Odontomyia*, the kindred genus, is far from uncommon.

Odontomyia Meig., 1804.

Klass. i., 128.

Table of species.

- A Scutellum spined (generic character).
- B Abdomen black, with lighter dorsal bands, or edges of abdominal disc pale.
- C Legs mostly black.
 - Abdomen, with pale dorsal band. Long. 5 mm. *minuta* Fab.
 - Abdomen, with only the edges pale Long. 8 mm. *atraria* Wlk.
- CC Legs mostly yellow, with or without darker bands. Abdomen black with pale edges.
 - Legs all yellow; smaller species. Long. 6 mm. *bifascia* Wlk.
 - Legs with or without black bands, little larger species.
 - Femora and tibiæ with black bands . . . Long. 8 mm. *æqualis* Wlk.
 - Femora and tibiæ all yellow.
 - Antennæ all reddish yellow. Thorax gold striped; abdomen with greenish yellow side spots Long. 8 mm. *viridana* Wied.
 - Antennæ with base only yellow. Thorax with gold pubescence; abdomen with narrow pale border. Long. 8 mm. *cinctilinea* Wlk.
- BB Abdomen pale; yellow, green, or tawny, with or without black dorsal stripe or bands.
- D Legs mostly black.
 - Thorax unstriped Long. 5 mm. *pusilla* Fab.
 - Thorax with 2 silvery stripes. Long. 9 mm. *siderogaster* Wied.
- DD Legs mostly pale, or slightly marked with black.
- E Abdomen uniformly pale, without dorsal or transverse black bands.
 - 1. Thorax black with light hair; 3 black stripes Long. 8 mm. *finalis* Wlk.

2. Thorax black with bright red
brassy pile Long. 5 mm. *rubrithorax* Macq.
3. Thorax black with light hair,
unstriped.
Legs entirely yellow Long. 8 mm. *diffusa* Wlk.
Legs not entirely yellow.
Posterior femora and tips
of tibiæ brown Long. 7 mm. *claripennis*
Thoms.¹
Femora and tibiæ tawny,
coxæ more or less
black Long. 10 mm. *lutatius* Wlk.
- EE Abdomen pale, with black dorsal stripe
or transverse bands.
- F Legs partly black, or with distinct black rings.
 1. "Posterior legs black, testaceous
at base" Long. 9 mm. *consobrina* Macq.
 2. Legs pale. 4 posterior femora
and tibiæ with broad black
rings Long. 5 mm. *ochracea* Bru. sp. nov.
- FF Legs all pale (femora narrowly ringed in *immaculata*).
 1. Thorax brassy Long. 6 mm. *soleennis* Wlk.
 2. Thorax pale green with yellow
hair, legs reddish. Long. 12 mm. *ochropa* Thom.
 3. Thorax black, with lighter hair.
- (a) Small species, indistinct brown
bands on femora Long. 5 mm. *immaculata*
Bru. sp. nov.
- (aa) Larger species—
 1. Thorax with bright
tawny hair. Long. 9-11 mm. *garatas* Wlk.
 2. Thorax with whit-
ish down. Long. 12 mm. *immiscens* Wlk.
 3. Thorax with short,
golden yellow hair. Long. 8 mm. *restricta* Wlk.
 4. Thorax with silver
tomentum. Long. 10 mm. *staurophora* Sch.
- AA Scutellum with two exceedingly minute
spines Long. 5 mm. *submutica* Bru. sp. nov.
- AAA Scutellum unspined Long. 11 mm. *mutica* V d. Wulp.

O. minuta Fab., 1792.

(*Stratiomys*) Ent. Sys., iv, 268.

♀ Tranquebar, East India. Type in Fab. Coll.

In the Indian Museum Collection I find 1 ♀ taken at the end
of June, and have taken 2 ♀ ♀ myself in Calcutta.

¹ I am not quite sure that this species belongs to my sub-division E—the author's description reading "abdomen pallide flavum, limbo prasino," yet this hardly reads like a distinct dorsal stripe, or wide transverse bands.

O. atraria Wlk., 1865.

Pr. Linn. So., viii, 106.

♂ ♀ Papua.

O. bifascia Wlk., 1861.

Pr. Linn. So., v, 232.

♂ Dorey (Papua).

O. æqualis Wlk., 1861.

Pr. Linn. So., v, 271.

♀ Batjan.

O. viridana Wied., 1824.

Analec. Entom., 29.

Bengal, Ternate, Tibet.

O. cinctilinea Wlk., 1862.

Pr. Linn. So., vi, 4.

♀ Gilolo.

O. pusilla Fab., 1792.

(*Nemotelus*) Ent. Sys., iv, 268.

Tranquebar. Allied to *minuta* F. and to my new species *submutica* and *incompleta*.

O. siderogaster Wied., 1830.

Ausser. Zweifl., ii, 65.

♀ Java. Type in Westermann's Coll. Also in Leyden Museum.

O. finalis Wlk., 1860.

Pr. Linn. So., iv, 94.

♀ Makassar and Manado (both Celebes). I took one ♀ at Rangoon, 18th August 1906. The abdomen (if the species is correctly identified) is "dirty tawny black" to use a Walkerian expression, and the specimen is only 7 mm. long.

O. rubrithorax Macq., 1838.

Dip. Exot., vol. i, 185.

♂ Bengal. Macquart says it resembles *Stratiomyia cuprina* Wied, from Brazil, but that species is much larger.

O. diffusa Wlk., 1854.

List. Dip. Brit. Mus., v, 53.

♀ Java, Sumatra. I am in much doubt as to the limits of this species.

O. claripennis Thoms., 1868.

Eugenie Reise, 456.

♂ Manila. Said to be near Macquart's *albipennis*.

O. lutatius Wlk., 1849.

List. Dip. Brit. Mus., iii, 532.

♀ Malacca.

A ♀ from Siliguri, N. Bengal, in the Indian Museum dated 30th June 1906 is undoubtedly this species. The legs are all yellow, whereas Walker says "hips" black.

O. consobrina Macq., 1847.

Dip. Exot. Supp. 3, 16 ; pl. i, 8.

♂ Java, Sumatra. Macquart's diagram of the antenna shews it rather thicker than is usual in this genus.

O. ochracea mihi, sp. nov.

♂ Calcutta. Vertex and front, shining black ; lower part of head, yellowish white ; mouth black ; eyes practically, but not absolutely contiguous just above frontal triangle, diverging thence to vertex. Antennæ brown, 3rd joint black, the 1st joint a little longer than the 2nd. Thorax shining, dark ænus black, with sparse very short gold hair. Scutellum pale, base black, spines small, pale yellow. Abdomen in life—peach colour, after death—pale ochreous tawny, with a dorsal row of 4 black spots, of which the basal one is largest and triangular, the 2nd very small and round, the 3rd large and transversely oval, the 4th much smaller and of the same shape. Belly unicolorous, the last two dorsal spots being visible from below. Legs pale yellow tawny, all the femora with a broad brown ring in the middle ; posterior tibiæ and upper side of posterior tarsi dark brown. Wings quite limpid, veins invisible, except along the fore border. Long. 4 mm.

Described from 2 ♂♂ in the Indian Museum Collection (including the type specimen) and 2 ♂♂ in my own Collection—all taken in Calcutta.

O. solennis Wlk., 1851.

♂ East India. Ins. Saunds. Dip., 79.

O. ochropa Thoms., 1868.

Eugenie Reise, 456.

Manila. Very near *O. viridana* Wied. There are several specimens (♂ ♂ ♀ ♀) of a species near this one in the Indian Museum Collection, from Bangalore and Calcutta.

O. immaculata mihi, sp. nov.

♂ N. India. Long. 5 mm., length of wing 5 mm. Type in Indian Museum Collection. Head black, with very short pale hair below, a shining black tubercle immediately below antennæ, which are black, 1st and 2nd joints tawny. Eyes contiguous for a short distance thus forming a small triangle above antennæ, and another on the black vertex. Eyes large, upper facets much larger. Thorax dull black with short, meagre goldish pubescence, black below with a little short white hair at the sides. Scutellum all black, spines very short. Abdomen pale greenish or tawny, with more or less distinct traces of a pale brownish coloration on apical half; this spot may not be a natural coloration, but due to the contents of the body. Wings quite clear, veins invisible except those on foreborder, which are tawny. Discal cell so minute as to be almost invisible: alulæ bright yellow. Legs tawny yellow, anterior femora with a narrow, brown ring in middle; intermediate femora with a brown ring near tip. Tarsi tips slightly darker. One ♂ from Bhim Tal,¹ 4,500 feet, captured by Dr. Annandale, 22nd to 27th September 1906. What I believe to be the ♀ of this species, is represented in the Indian Museum Collection by a single specimen taken in Calcutta, 5th April 1907.

O. garatus Wlk., 1849.

List Dip. Brit. Mus., iii, 532.

♀ China.

O. immiscens Wlk., 1860.

Pr. Linn. So., iv, 94.

♂ Makassar. Osten Sacken describes a ♀ from Kandari (Celebes) taken April 1874, adding that he has seen Walker's type in the British Museum and believes it to be the same species, although not agreeing entirely with the description.

O. restricta Wlk., 1864.

Pr. Linn. So., vii, 203.

♂ Mysol.

O. staurophora Sch., 1868.

Novara Reise, 59.

2 ♀ ♀ Hong Kong.

O. submutica mihi, sp. nov.♀ Bengal. In *minuta* F. group. Head above, below, front, and

¹ Also in Indian Museum collection from Bareilly and from Calcutta (June 6th). I took one ♂ at Calcutta (31st March 1907).

a wide band behind eyes, bright yellow. Eyes rather small, black facets of uniform size. A blackish brown band stretches across the vertex from eye to eye, with a central larger spot. Two large round spots on front, below vertex, two much smaller ones just below antennæ, a small spot immediately below base of antennæ, and the proboscis, black. Thorax black, with very short silvery cinereous pubescence, sides black, pleuræ pale yellow. Scutellum yellow, base black, bearing two almost microscopic spines. Abdomen pale yellow, tinged with grey, 1st segment yellow, posterior border black in centre; 2nd, yellow, occupied by a black band not reaching the sides, placed along the foreborder, and extended posteriorly in the centre, and at the sides; 3rd, 4th and 5th with black bands from anterior border, nearly to posterior border, and not reaching sides of segments; last segment very small, all yellow. Wings quite clear, veins, costal cell and stigma pale yellow. Legs yellow, femora with broad brown band about the middle, tips of posterior tibiæ, and tips of tarsi, blackish. Halteres pale green. Of the three specimens (♀) I have seen, one is in the Indian Museum, from Siliguri, and the other two I took myself in Calcutta, 5th March 1905, and 1st February 1907, in grass near ponds at Tollygunge.

O. mutica V der Wulp, 1885.

Notes Leyd. Mus., vii, 62.

♂ Ternate. The author compares this to the North American species *nigirostris* Lw., a species which, in general facies, seems to have some resemblance to a *Lasiopa*.

This species having an unspined scutellum may perhaps be placed in a new genus, in which my *submutica* might also enter.

Euceromyia Big., 1877.

Bull. So. Ent. Fr. (1877), p. lxxiv.

E. nexura Wlk., 1859. (*Stratiomys*) Pr. Linn. So., iii, 80.

♂ ♀ Aru Isles; also from Mysol. Long. 7 mm.

In concluding these notes I wish to thank Dr. Annandale, Officiating Superintendent of the Indian Museum, Calcutta, for his kindness in affording me access to the Museum Collection and Library. They were originally intended only as a revised list of Oriental species of Stratiomyidæ for my own use, but gradually extended to their present form, and I must again attribute to the paucity of material at my command any errors or deficiencies that may be found.

I hope to visit England shortly, and shall then be able to correct any errors, at least as far as Walker's species are concerned, by an examination of his types at the British Museum. Such corrections will be incorporated in a supplementary paper and published in this journal.

ADDENDUM.

Acanthina argentea, mihi, sp. nov.

♂ Calcutta. Long. 3 mm. Eyes extending the whole height of the head shortly but not thickly pubescent, subcontiguous at nearest point of approach as the frons at this point is receding but attains the surface of the eyes towards the vertex, which is considerably raised and occupied by the ocelli; facets rather large, of uniform size. Frons, both above and below the nearest approach of the eyes, shining white. Back of head and under-side of head black, inner orbit of eyes below antennæ white. Antennæ, structurally, exactly as in Wiedemann's generic description, with first two joints black, third reddish-brown with blackish marks: style thick. Proboscis short, yellowish, with a few hairs. Thorax, dorsum and sides, and scutellum black, both uniformly covered with short silvery-grey pubescence. Scutellum with four rather large whitish spines. Abdomen black, covered like the thorax with short silvery-grey pubescence. No signs of any marks or pattern on either thorax or abdomen. Belly black, with short grey hairs. Legs yellowish-white; femora black, extreme base and tips pale; tibiæ with a broad black band, leaving only the basal fourth and the tip pale. Wings and stigma absolutely colourless, but veins distinct, though pale: alulæ very small, brownish-white; halteres brownish-yellow, knob white.

Described from a perfect ♂ in the Indian Museum Collection, taken at Calcutta on 22nd May, 1907. The small size of this species will easily distinguish it from the other two species mentioned.

VII.—DESCRIPTION OF AN OLIGOCHÆTE WORM ALLIED TO CHÆTOGASTER

By J STEPHENSON, *Major, I.M.S., Professor of Biology,
Government College, Lahore.*

The worm described below was found in water taken from a tank in the pleasure-gardens at Shalimar, near Lahore, in the early part of February, 1907. It lives well in water kept in small vessels with a little green alga in the laboratory, and appears to propagate itself asexually with freedom. Specimens have been under observation at various times during the last month.

External characters.—In length the animal measures from 1 to 2 mm. ; the variations are considerable, and depend principally on the stage which the asexual reproductive process has reached (*v. inf.*). There is a short blunt prostomium, followed by a region slightly swollen in an ovoid manner and corresponding to the pharynx ; the rest of the body is of uniform diameter, showing a wrinkling corresponding to the degree of contraction of the animal, but no regular annulation. The anterior end of the body is studded with a few fine hairs ; and similar hairs also occur posteriorly in the neighbourhood of the anus. The whole animal is very transparent.

Segmentation.—As just said, there is no external annulation ; the segmentation is, however, indicated externally to some extent by the bundles of setæ. The first setæ are placed ventro-laterally on the slightly swollen anterior region, and may be taken to belong to the second body-segment ; the next bundles are placed some distance further back, this achætous interval being in length equal to about three of the immediately following segments. The bundles then succeed each other regularly, being placed, however, closer together at the posterior end of the animal.

Internally the segmentation is defined by the septa, of which the first occurs at the posterior end of the pharynx, behind the level of the first bundle of setæ, and may be taken to be the posterior limit of the second segment : the next septum occurs at the posterior end of the œsophagus, similarly delimiting the third segment ; in the region of the crop there are three septa, the first of these about the junction of the anterior and middle, the second about the junction of the middle and posterior thirds, and the last near the hinder end of the crop. The second bundle of setæ occurs at the level of the posterior part of the crop, in the sixth body-segment according to the limits established by the septa. Segmentation is also evident internally in connection with the ganglia of the ventral nerve-cord and with the nephridia (*v. inf.*).

Setæ.—There are two bundles of setæ in each segment in which they occur, and there are about six setæ in each bundle; five and seven are also met with. They are ventro-lateral in position; the portion which projects externally is approximately equal in length to the portion within the body; and the whole length of a seta is equal to about two-thirds the diameter of the body when the latter is in the condition of moderate extension. Each seta has the form of an elongated $\int$, the end is unequally forked, and there is a small nodulus (*v.* plate v, fig. 2).

When the animal is at rest, most of the setæ project at about a right angle; those of the most anterior bundles, however, lie flat against the surface of the body, their free ends forwards. The somewhat hooked free ends of the setæ may point either forwards or backwards (I do not refer to the direction of the seta as a whole); in the setæ of a single bundle, the hooks of some may point forwards, of others backwards; and a bundle of setæ, the hooks of which are pointing forwards, may be seen shortly afterward with hooks pointing backwards; some of the muscular fibres attached to the setæ have, therefore, the power of rotating the setæ about their longitudinal axes. A common arrangement is for the hooks to point backwards in the anterior, forwards in the posterior segments. Backward-pointing hooks are presumably of use in forward progression, forward-pointing hooks in backward progression. The first bundles, however, appear always to have their hooks pointing backwards.

The distribution of setal bundles in the anterior part of the body is apparently subject to slight variation; on one occasion a few small setæ were noted in the third body-segment; in another case those of the sixth segment were fewer and smaller than normal.

Asexual reproduction.—The smallest number of segments observed was eight (*v.* plate v, fig. 3 *a*); the body, that is, came to an end at the end of what I have called the "stomach," and comprised only four pairs of setal bundles; there was, in addition a commencing constriction visible, which if completed would separate off the posterior two segments. This specimen may have been pathological; the body-cavity contained numerous clear, oval or irregular corpuscles, apparently non-nucleated, which were seen in no other specimens; it was in this animal also that the setæ of the sixth segment were fewer and smaller than usual.

All the other animals examined were divided by a well-marked constriction into two parts, an anterior, of at least eight body-segments, and a posterior, of varying length; these two principal divisions of the worm were usually again divided by slighter constrictions. Thus the anterior portion might consist of eight body-segments, the posterior of four setigerous segments (plate v, fig. 3 *b*); or the anterior of eight body-segments, the posterior of six setigerous segments (*c*); or the anterior of eleven body-segments, the posterior of seven setigerous (*d*); or the posterior portion might comprise eight setigerous segments, and be again divided into two

parts each bearing four pairs of bundles, the four posterior segments of the anterior part of the body being also separated by a distinct constriction from those in front (*e*); finally, in a specimen where a deep constriction divided off an anterior portion of eleven body-segments from a posterior of eight chætigerous segments, the new prostomium, mouth, buccal cavity and cerebral ganglion of the posterior half could be distinctly seen (*v.* plate v, fig. 4). The regions of the alimentary canal which I have called "crop," and "stomach" are, however, differentiated in the posterior half of the dividing worm at an earlier stage than this. It may be noted here that the seat of the constrictions, secondary as well as primary, is always marked in addition by a conspicuous extension laterally of the nervous matter of the ventral chain; these lateral extensions spread so far as almost to meet dorsally, and this takes place on the anterior as well as on the posterior side of the actual site of constriction (*v.* plate v, fig. 5).

Figure 6 represents the site of constriction in one of the specimens examined. The anterior setal bundles of the posterior worm are seen to be developing; they thus arise as new formations, and from the first point forwards, not perpendicularly outwards. If the groups of setæ already existing posterior to these (originally the first pair behind the constriction) persist as the setæ of the sixth segment of the second worm, then each act of fission involves the intercalation of five newly-formed body-segments behind the site of constriction. The same figure shows also a group of developing setæ immediately in front of the constriction; new segments are therefore formed on both sides of the site of constriction.

Alimentary system.—The mouth is ventral, and leads into a buccal cavity of small extent. This is succeeded by the pharynx, a thick-walled tube, which extends backwards as far as the septum between the second and third segments, and is attached to the body-wall by numerous fine, short, sometimes Y-shaped muscular fibres. The oesophagus occupies the third segment, it is narrower behind than in front, and is usually short, about half as long as the pharynx; in the specimen mentioned previously as being perhaps pathological, it was of a length about equal to that of the pharynx. The crop, which follows, is a dilated portion of the canal, occupying a little more than three segments, the fourth, fifth and sixth, its posterior end being in the seventh segment; its walls are clear, and one cell in thickness; the degree of its distension varies; it may be ballooned so as to occupy the whole of the body-cavity in its own segments.

A well-marked and constant constriction separates the crop from a second dilated region of the alimentary tract, which is distinguished by being slightly pigmented, of a light yellowish-brown colour, and by containing a large number of refractile globules like minute drops of oil in its walls. It is situated in the seventh and eighth segments. The intestine occupies the remainder of the body; its diameter is less than that of the stomach but varies somewhat; the anus is terminal.

The *body-cavity* is extensive, and (with the exception already noted) was not seen to contain corpuscles. The septa are delicate partitions showing swellings indicative of nuclei (*v. fig. 7*).

Circulatory system (*fig. 8*)—The dorsal vessel extends from the hinder end of the body to the prostomium, and is pulsatile along its whole length except for a very short distance in front, anterior, that is, to the level of the refractile particle of the cerebral ganglion (*v. inf.*) close to which it runs; the contractions proceed from behind forwards. There are two lateral vessels, of calibre approximately equal to that of the dorsal vessel, which encircle the œsophagus, uniting ventrally with the ventral vessel; they are also contractile, the contractions progressing from above downwards. The ventral vessel cannot be traced quite as far forward as the dorsal; it is of about the same calibre, and is nowhere pulsatile. There appears to be a fine plexus of capillaries on the external surface of the crop and stomach (*v. fig. 9*). The blood is colourless and contains no corpuscles.

The *Nephridia* are much-coiled fine tubes, which, however, become thicker, with more granular walls, near their external opening; this is situated a short distance in front of the bundle of setæ of the same segment. The canal is somewhat dilated just before it opens to the exterior. I could not distinguish the beginning of the tube; no ciliary action was visible in any part of it; nor did the nephridia appear to be connected with the septum in front of them. Nephridia are constantly found in the seventh and eighth segments at the sides of the stomach; for the rest, their distribution varies (*v. fig. 10 a and b*). They are not found in any of the segments that have recently formed.

Nervous system.—The cerebral ganglion is situated far forwards, just behind the prostomium, occupying a space corresponding to the buccal cavity and anterior part of the pharynx. It is not distinctly bifid, but rather irregularly lobulated in shape (*v. fig. 7*). One particular portion, spherical in shape, slightly more refractile than the rest, and situated at the level of the junction of buccal cavity and pharynx, stands out in all specimens; posteriorly there is closely opposed to it a bright, somewhat granular mass, semilunar in shape as seen sideways (*v. fig. 7*). I am unacquainted with a similar structure in other forms, and have no suggestions to make as to its function, unless it be a degenerate otocyst.

The circumbuccal commissures are situated at the level where the buccal cavity passes into the pharynx. The subpharyngeal ganglionic mass is irregularly lobulated, broad from side to side, narrowing posteriorly to become the ventral nerve-cord. Some small lobes frequently appear entirely detached from the main nerve-mass. The ganglia of the ventral cord are placed at the level of the setæ in each segment; in the achætous interval (3-5 segm.) there are irregular swellings on the cord, which do not appear to have the definiteness of the ganglia in the following segments. The ventral cord is of considerable thickness and is always very easily seen; it is not united with the epidermis. Its double origin is perhaps indicated

by its bifid anterior end and the median row of buttonhole-like perforations in its anterior portion which are shown in fig. 11.

The upward growths of nervous matter within the body-wall at the site of the constrictions have already been mentioned. The cerebral ganglion can be distinguished in the posterior portion some time before this is ready to separate.

Under an oil-immersion lens the nodulations on the ventral cord, which aggregated together form the ganglia, are seen to consist of spherical hyaline cells with nuclei, placed mostly in the dorsal sides of the cord.

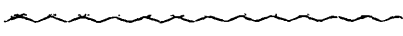
Sense organs are represented by the tactile hairs, and possibly by the refractile particle in the cerebral ganglion.

No *sexual organs* have so far been observed.

The mode of examination adopted throughout has been the observation of the living animal under the microscope; its transparency renders this easy. A stained specimen revealed comparatively little of the structure of the animal.

The predominance of asexual reproduction, together with the presence of a nervous system unconnected with the epidermis, places this form at once among the Naididæ. The total absence of hair-setæ, of dorsal setæ altogether, and of ventral setæ also in the third, fourth and fifth segments, would seem further to assign it to the genus *Chætogaster*. The definition of this genus, however, includes a reference to the third segment, which is much elongated in all forms hitherto recognised as belonging to the genus; while in the form now described the third segment is commensurate with the œsophagus, and of no greater length than the two succeeding segments. In *Chætogaster*, also, the longitudinal commissures of the ventral cord are separate from each other in the anterior part of the body; this can hardly be said of the form now described (v. fig. 11). The definitions of genera include no reference to the alimentary canal, and I cannot say whether or not the differentiation of the parts of the tract which I have called "crop" and "stomach" occurs in the various species of *Chætogaster*.

If, in consideration of the similarity in other respects of this form to the species of *Chætogaster*, it should be thought advisable to widen the definition of the genus so as to include it, I would suggest *punjabensis* as a suitable specific name; since, besides the characters mentioned above, it differs in its length, or transparency or extent of the œsophagus, or the characters of the circum-œsophageal vascular ring, or the number of setæ in each bundle, or in more than one of these points, from the several species described by Michaelsen (*Oligochæta*, 1900) as belonging to the genus.



EXPLANATION OF PLATE V.

- FIG. 1.—General view of the animal from ventral surface.
an. Anus. *an. h.* Anal hairs. *c.* Constriction. *cr.* Crop.
i. Intestine. *m.* Mouth. *æ.* Œsophagus *ph.* Pharynx.
pr. Prostomium. *s*¹, *s*², *s*³. First, second and third
 bundles of setæ. *sg*³⁻⁷. Third to seventh body-seg-
 ments. *s. h.* Sensory hairs on anterior part of body.
*sp*¹⁻⁵. Septa in the anterior part of body. *st.* Stomach.
- FIG. 2.—A seta.
- FIG. 3.—*a-e.* Diagrams illustrating asexual reproduction.
- FIG. 4.—Site of division.
b.c. Buccal cavity. *c.g.* Cerebral ganglion. *int.* Intes-
 tine of anterior animal. *sph. g.* Subpharyngeal ganglion.
 Other letters as before ; all except *int.* have reference to
 the posterior animal.
- FIG. 5.—Lateral view of the site of constriction, showing lateral
 extension of nerve-cord in this situation.
int. Intestine. *l.e.* Lateral extension of nerve-cord.
v.n.c. Ventral nerve-cord.
- FIG. 6.—Growth of seta' bundles near the site of a constriction.
- FIG. 7.—Lateral view of anterior part of body.
b. cav. Buccal cavity. *b. comm.* Buccal commissure.
f. Fibres attaching pharynx to body-wall. *n.* First
 nephridium. *r. p.* Refractile particle in the cerebral
 ganglion. *s. m.* Setal muscle fibres. *sp.* Septum, show-
 ing a projection due to a nucleus in its substance.
 Other letters as before.
- FIG. 8.—Diagram illustrating chief blood-vessels. The arrows
 show the direction of the contractions.
- FIG. 9.—Part of wall of crop, showing capillary blood-spaces
 outside the crop epithelium.
c. Capillary blood-space. *n.* Nucleus. *ep.* Epithelium
 of crop.
- FIG. 10.—Diagram illustrating distribution of nephridia : parts of
 the alimentary canal are outlined.
*n*¹⁻⁷. The nephridia. *st*¹. Stomach of anterior animal.
*ph*², *æ*², *cr*², *st*². Pharynx, œsophagus, crop, and sto-
 mach of posterior animal.
- FIG. 11.—Anterior part of nerve-cord, seen from the ventral surface.
is. Islands of nerve-tissue isolated from the rest. *pf.*
 Perforations along the median line of the subpharyngeal
 ganglion. Other letters as before.

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

PART IV.—HYDROZOA.

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

Only one species of Hydrozoon, *Irene ceylonensis*, occurs at present in the ponds themselves, but two others have been found in one of the small pits close to the embankment of the river, and might easily be carried into the ponds by a flood. As the smaller pits dry up completely before the end of winter, the presence in them of these hydroids is probably accidental, coming about only when the embankment is broken and water enters from the estuary, bringing with it eggs, larvæ or medusæ. Considering the three species found in brackish water at Port Canning together, *Irene ceylonensis* is the only representative of the Calyptoblastea, the two from the pit being both Gymnoblasic; of these latter, one is an undescribed species of *Syncoryne* or possibly of a new genus, while the other must be regarded at present as identical with the European *Bimeria vestita*, from which, however, further research may ultimately prove it specifically distinct.

Syncoryne filamentata, sp. nov.

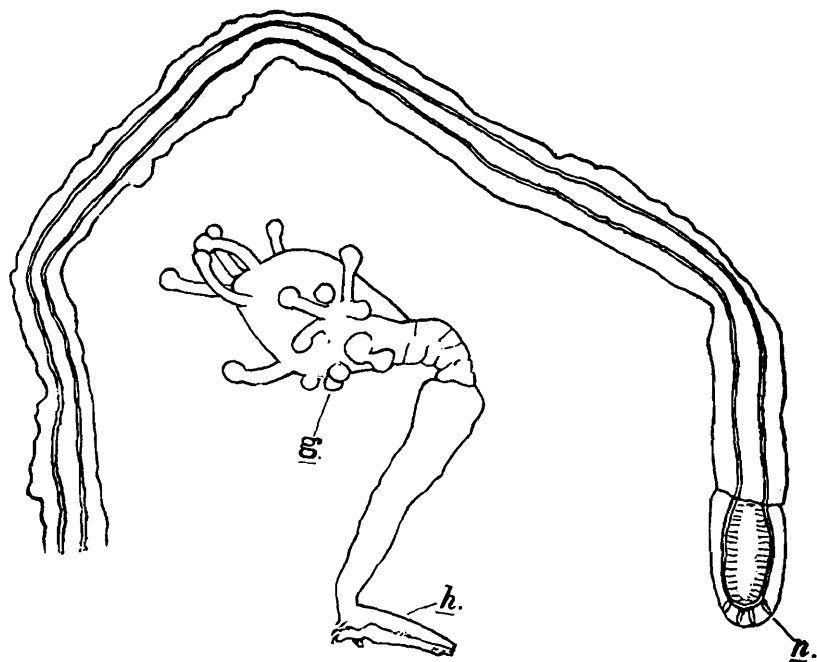


FIG. 1.—Trophosome of *S. filamentata*, $\times 21$. Hydranth and free filament (the latter in optical section). n=nematocyst: g=gonosome: h=hydrorhiza.

Trophosome—

Colony glistening white in colour. Hydrorhiza branches sparingly, does not anastomose, gives rise at intervals to single upright polyps, and is produced at the extremities of the ultimate branches into long, free filaments, the distal ends of which are often slightly

clubbed. The stem of the hydranths is obscurely annulated, their bases are surrounded by loose sheaths of the perisarc. The distal extremity of the filaments is free from the perisarc and contains nematocysts in the ectoderm. The hydranths are spindle-shaped and bear ten to fourteen capitate tentacles, which are arranged in two distinct whorls.

Gonosome—

The medusæ are borne only at the base of the inferior whorl of tentacles on the hydranths; they are minute, subquadrate in transverse section, somewhat elongate, regularly and profusely tuberculate externally, colourless. The manubrium is conical, short, incapable of being extended as far as the opening of the bell; the velum extensive; the four tentacles short and stout, capitate, without swellings except at the extremities. (This description refers only to the young medusæ before the appearance of the gonads for the later stages have not been observed.)

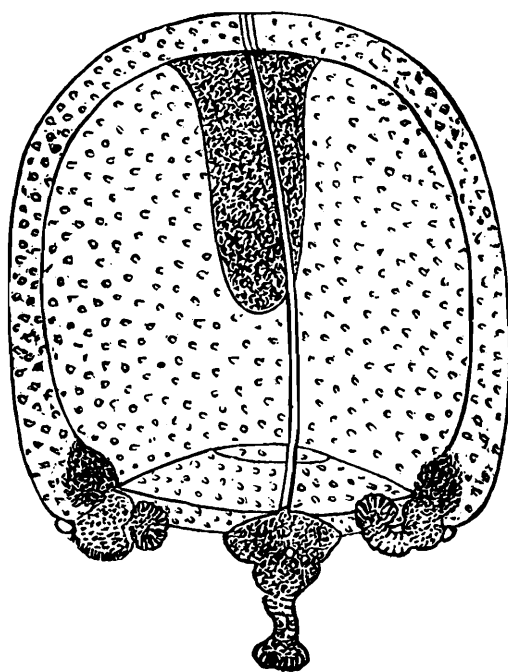


FIG. 2.—Young free gonosome of *S. filamentata*, highly magnified.

I found only one example of this species; it surrounded a grass-stem at the edge of the pit in which the next form was also taken. The spaces left vacant between the branches were filled by large numbers of a gregarious Vorticellid Protozoon, the bases of the individuals of which were inserted in a common covering of mucus and sand grains. Numerous medusæ were set free in a glass of water in December and were kept under observation for two days, at the end of which they died. Their manubria appeared to be imperforate and their tentacles remained short and stout. They moved through the water both vertically and horizontally by regular pulsations of the bell. Some specimens were killed and preserved in two per cent. formol; they became longer in proportion to their

girth than was the case with living individuals in a position of rest, owing to the fact that they died with the velum in a state of contraction. The figure (fig. 2) was drawn from a living specimen; it represents the tubercles on the external surface as rather larger and more conspicuous than they really are, and only shows one of the four radial canals.

The free filaments of the trophosome are flaccid and incapable of independent movement.

Bimeria vestita, Wright.

From bricks in the river at Port Canning and from a pit of brackish water at the same place; previously recorded from northern Europe and South America.

My specimens differ in one important character from those described from Europe, namely in

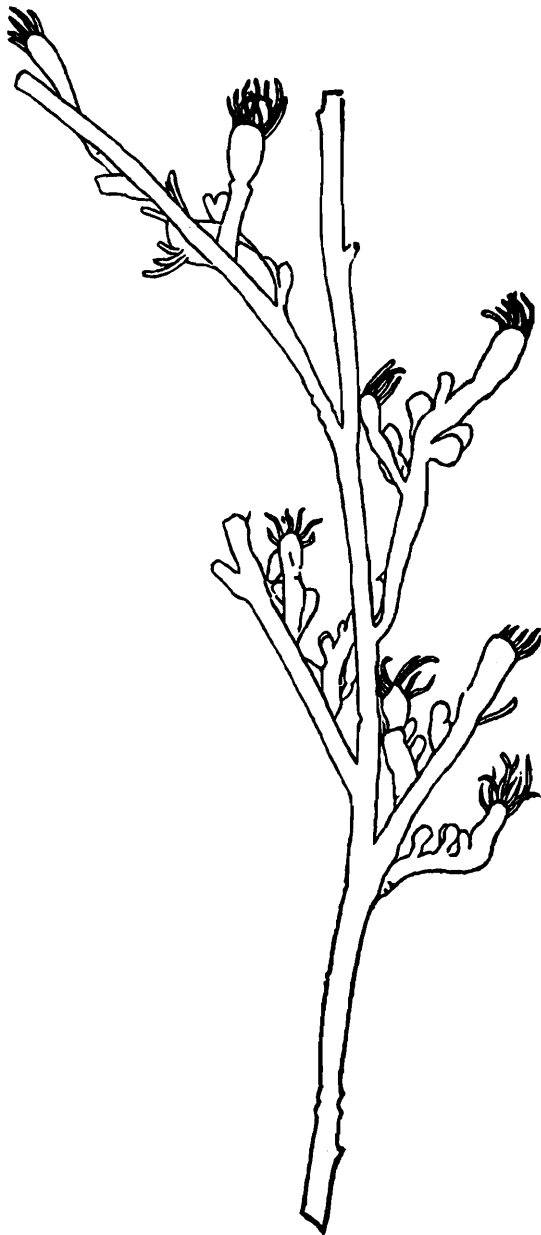


FIG. 3.—*B. vestita*; part of a colony from pit of brackish water, Ganges delta, $\times 16$.

the extent and nature of the chitinous investment of the perisarc. Allman (*Mon. Gymn. Hydr.*, p. 298) describes "the chitinous sheaths which invest the bases of the tentacles" as "suggesting the idea of a half-gloved hand" and being of a brown colour. This is not the case in the specimens from Port Canning, in which the perisarc is of a pale horn-colour and the chitin disappears at the base of the tentacles so gradually that it is impossible to say exactly at what point it ceases. In specimens from the Matla, however, it is darker and extends further upwards than in the one from the pit. Torrey (*Pub. Univ. California, Zool.*, i, p. 27) has pointed out that the extent and thickness of the chitinous perisarc, which was formerly regarded as a generic character separating *Bimeria* from *Garveia*, is liable to considerable variation in North American species, of which several have been described. Another but less noteworthy point in which my specimens differ from the typical form, is the irregular and often indistinct annulation of the stalks of the gonosomes; but

this cannot be regarded as a constant character. Judging from Hartlaub's figure (*Zool. Jahrb.*, 1905, suppl. vi, p. 534), his South American specimens represented a depauperated form. The Port Canning colonies, however, are vigorous, the upright stems branching freely and attaining a height of about 15 mm. All the gonosomes (in December) were female, each bearing a single egg, round which the spadix, which was simple, had coiled itself.

Irene ceylonensis, Browne.

From one of the brackish ponds at Port Canning; the medusa originally described from off the coast of Ceylon.

Trophosome—

Colony minute, barely visible to the naked eye, colourless; perisarc extremely delicate. Hydrorhiza strongly adherent, branches sparingly, does not anastomose, gives rise at intervals to single upright polyps. Hydrotheca nearly cylindrical, with a short pedicel, which is about one-seventh as long as the cup and bears more or less distinct annulations; an operculum present, consisting of a number of triangular flaps which close together above the contracted hydranth. Hydranths highly contractile, with about fourteen tentacles, which are capable of great elongation; the disk shallow; the hypostome inconspicuous.

Gonosome—

Gonosome borne on a long, more or less distinctly annulated stalk, which as a rule carries a single medusa. Two or more younger medusæ are, however, occasionally produced at the base of and at right angles to the first, the main axis of which is that of the pedicel. Each medusa is contained in a separate gonotheca, which is ovoid variable in size, always larger than the hydrotheca, and has a single aperture produced by the rupture of the membrane above; the gonophore is a simple cylindrical body. Medusa at first almost hydra-like in appearance, with the umbrella feebly developed and with four stout, tapering tentacles, by means of which progression is effected. Adult medusa measuring 20—25 mm. in diameter, the depth of the bell being less than the breadth. No cirri; tentacles about 100, some of them often represented by small tubercles; otoliths from one to four in each sense-organ,



FIG. 4.—Gonotheca of *I. ceylonensis*, $\times 140$.

a sense-organ occurring between each pair of tentacles; four radial canals; manubrium stout, conical, colourless; stomach small; mouth surrounded by four fringed lobes; gonads colourless, consisting of linear bands and extending when mature from the base of the manubrium to the periphery of the bell.

The whole perisarc of the hydroid of this species is so delicate that the thecæ can only be seen with difficulty even in the living colony; in preserved specimens their outlines are always distorted. The constant presence among them, in the pond, of the very much stouter and less transparent thecæ of the Protozoon *Folliculina ampulla* was at first a source of confusion to me, until I saw both organisms expanded.

The gonosomes are produced in November, December and January. At the beginning of December (1906) the medusæ in the pond were still immature, although many of them had almost attained their full size; towards the end of the same month their gonads were ripe, while at the beginning of the next month only dead or dying medusæ could be found. By March 17th another brood had reached maturity, having probably been produced by the young gonophores observed on the colonies in January. In March, however, no hydroids were found; probably they had been killed by the increased temperature of the water, which was perceptibly warm to the hand in the middle of the day. In my aquarium they soon perished unless the glass was shaded from the direct rays of the sun. Neither medusæ nor hydroids could be found in the pond at the end of May.

A peculiarity, which may have been due to the rise in temperature, was noted in the March brood of medusæ. Those which reached maturity in December agreed with the original specimens from Ceylon in not having more than two otoliths in each sense-organ, but those taken in March had either three, four, six or eight. When three or four were present, they were arranged in a single series approximately at right angles to the periphery of the bell; but when the number was six or eight, they formed two parallel series oriented in the same manner. In some instances it was possible to see that the otoliths of smaller series were actually dividing to produce larger ones, the direction of division being always the main axis of the series. The size of the cyst was always larger when six or eight otoliths were present, and in several cases a partition had been formed between the two parallel series, dividing the cyst into two compartments. It was clear, therefore, that the cysts were multiplying by fission. Numerous new tentacles were also being produced, every stage occurring between small rounded swellings of the periphery and fully elongated tentacles. Browne (in Herdman's *Ceylon Pearl Oyster Fisheries and Marine Biology*, part iv, p. 140) remarked on these swellings and suggested that they were young tentacles, as has proved to be the case. He also observed that while the normal number of otoliths in a cyst was one, two were sometimes present. He thought it probable that this was a case of twinning, but in the light of the observations just recorded it seems more probable that it was one of division.

I have commented in the preliminary paper of this series on the survival of both hydroid and medusa in small masses of water from which a fresh supply of air was practically excluded. This was as noticeable in the March brood of medusæ as in the December one.

I did not find, however, that individuals of either brood lived for more than a few days in my aquarium, although they fed readily. Judging from the succession of broods in the pond, the life of the medusa, as might be expected, is short ; while the hydroid probably does not survive for more than one cold season.

The medusæ are sluggish in their movements. As a rule they do not swim at the surface but rise up to it occasionally by a rapid succession of pulsations, and then sink again with the dorsal surface of the umbrella downwards. On reaching the bottom they generally lie still for a few minutes and then rise obliquely sufficiently high to right themselves. When this has been effected, they often make another ascent to the surface, and the manœuvre may be carried out several times in succession. While they are sinking, the velum remains expanded and the tentacles maintain their position parallel to the longitudinal axis of the bell, except when they become entangled together. The manubrium is, however, in almost constant motion, twisting in all directions and apparently removing microscopic particles from the tentacles and the ventral surface of the velum. Occasionally the medusæ move through the water obliquely for a short distance by a regular series of slow pulsations, and more frequently they float along just above the bottom, on which the tentacles and manubrium trail, in an upright position.

Although the tentacles may be used in retaining microscopic organisms, which the manubrium removes from them, larger prey is captured directly by the mouth, which picks it up from the bottom. I have on several occasions observed young examples of the small univalve mollusc *Bithinella caningensis*, Preston, which is enormously abundant in the ponds, being seized in this way. A long struggle always ensued before the medusa was able to detach and lift the prey, which, however, was finally taken into the stomach, distending it greatly. The empty shell was ejected after a few hours. Another method of feeding was also observed, in this case on a filamentous alga. The medusa attached itself by its mouth to a filament of the alga and sucked out the contents, its stomach becoming perceptibly green in the process, which lasted for some hours.

These observations were of course made on captive specimens, but there is no reason to think that the actions recorded were in any way abnormal ; so little is known about the movements and feeding of medusæ that any notes of the kind have considerable interest. I could not detect evidence of either negative or positive heliotropism in the medusæ, but their powers of progression are so feeble that perhaps this was hardly to be expected. Their position in the pond appeared to be due entirely to the direction of the wind ; if there was no wind, they remained close to the plants of *Nais* on which the hydroid was growing, and on which *Bithinella* was very abundant.



IX.—FURTHER NOTE ON A POLYZOON FROM THE HIMALAYAS

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

In a recent note on the Indian freshwater Polyzoa (*Journ. Asiat. Soc. Bengal*, 1907, p. 92) I referred specimens from Kumaon to Ridley's *Lophopus ledentfeldi*, basing my diagnosis chiefly on the form of the statoblast. Having recently had occasion to re-examine a collection of débris from the surface of the lake (Bhim Tal) in which the specimens were taken, I have found several statoblasts which evidently belong to the same species but differ in a remarkable manner from those already described, showing close affinities to Hyatt's *Pectinatella carteri*. As intermediate forms occur I see no reason to change my opinion as regards the specific or generic identity of the Himalayan species, but it will be as well to give a more detailed description in order to avoid possible confusion in the future.

The Polyzoon occurred in small, transparent patches on the leaves and stems of water-plants, the colonies being easily detached from their support and probably having the power of changing their position. The ectocyst had all the characters of that of *Lophopus*, being swollen and hyaline, filling up the spaces between the cavities in which the polypides are placed, and completely investing the whole colony. Its external layer consisted of "star-shaped" and circular cells closely resembling those figured by Ridley (*Journ. Linn. Soc., Zool.*, xx, pl. 2). Similar cells occur in *L. crystallinus*, the smaller kind being in both species rather sub-rectangular than "star-shaped," but having the corners more or less definitely produced and the shorter extremities irregularly sinuate. The polypides were arranged on one or both sides of a single longitudinal axis, the colony being as a rule much longer than broad; but probably the regularity of this arrangement disappears in older colonies. When the polypides were retracted the external surface of the colony was smooth but slightly lobate. The tentacles were relatively very long; in a specimen preserved in formol the longest measured 1.3 mm. by 0.03 mm.; they generally numbered about thirty but were sometimes fewer. The stomach was of a bright yellow colour and was rounded at its inferior extremity. The polypides were small, as also were the colonies; the latter measured about 3—5 mm. in length, 2—3 mm.

in breadth, and the same in vertical length. The cavities in which the polypides were contained terminated bluntly below. All the statoblasts found *in situ* were rounded or truncate at the extremities, one end being often blunter than the other. As a rule they bore no processes or projections of any sort, but the whole structure was slightly curved, so that the one face was convex, the other concave; the sides were not folded in towards either face; the annulus projected very little from the surface, and the whole structure was very thin.

In a few of the statoblasts still in position in the colonies a

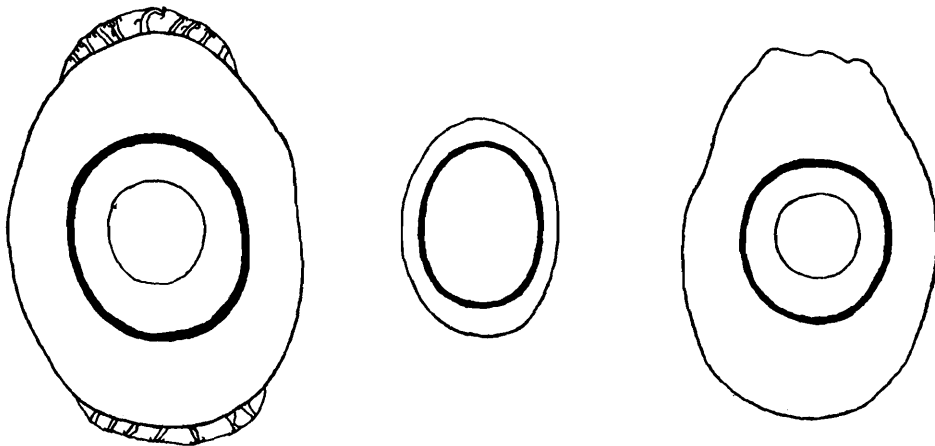


FIG. 1.

FIG. 3.

FIG. 2.

FIGS. 1 and 2 = statoblasts of *L. ledenfeldi* var. *himalayanus*, $\times 42$. FIG. 3 = statoblast of *P. punctata* from Calcutta (June), $\times 84$.

very careful examination has revealed a few short, truncate processes of the membrane joining together the valves at the extremities; but these processes are minute and have not a very definite form. The fact that their distal extremities are distinctly expanded proves that they have not been broken. The majority of the statoblasts taken on the surface of the lake were broken round the edges and especially at the ends; but a few were intact. Of these the majority were in the same condition as those still contained in the synœcium; but in a few cases processes similar to those already mentioned were found, while in one or two examples the processes were larger and better developed, although they always varied in size and number. The smallest were simply truncate and slightly expanded, but the larger ones bore at their free end a circle of minute, curved, blunt, relatively rather stout filaments, while the largest processes also bore one or two similar filaments arranged irregularly nearer the statoblasts. The processes were all flattened in the same plane as the statoblasts, and bent inwardly towards its concave face. The number of processes at the two ends of the statoblast was generally different; but in every case in which they were well developed they were arranged at either end in a graduated series, the largest in the middle and the smaller processes at either side, the largest occupying the extremity of the major axis of the valve.

As a rule the processes at one end were larger than those at the other. I have not seen more than nine or less than three processes together. Each series was enveloped in a delicate membrane. The central capsule of the statoblast was almost circular and occupied a considerable area as compared with the air-cells, being relatively larger, so far as can be judged from Carter's figure (*Ann. Mag. Nat. Hist.* (3), iii, p. 341, pl. 8, 1859), than that of Hyatt's Indian species. The colour of the capsule was dark brown, the air-cells being yellowish. Rousselet (*Journ. Quekett Microsc. Club*, 1904, p. 49) has lately placed *Pectinatella carteri*, which was found by Carter in Bombay, in a new genus (*Lophopodella*) created for an East African species, *L. thomasi*; Carter having originally assigned the former to the genus *Lophopus*. One of the most important characters of Rousselet's new genus, and indeed the only one on which he had to rely as regards the Indian species, was the nature of the processes at the extremities of the statoblast; but the absence of these processes from some statoblasts of the Himalayan species and their presence on others, forms a good ground for keeping both this species and the Bombay one in the genus to which Carter assigned the latter.

The Himalayan form agrees in every other respect with definitions of *Lophopus*; but Carter states that the specimens he found in Bombay did not have, as far as he could see, the syncœcium extending to the base of the colony. Unless or until fresh specimens are found which prove divergent from the genus in other respects, I would therefore call the species *Lophopus carteri* (Hyatt). Statoblasts agreeing with Carter's description have been found in East Africa and it may therefore be expected that the species, having a wide range, will be rediscovered before very long. The Himalayan statoblasts differ from those from Bombay in the irregularity or absence of the terminal processes and the relatively greater size of the central capsule, while the syncœcium of the colony appears to be more highly developed. I think it will be well to name the Kumaon form *Lophopus ledenfeldi* var. *himalayanus*, as it differs from the typical Australian variety in the following points: (a) the tentacles are not so numerous; (b) the statoblast is more irregular in outline; (c) the central capsule is almost circular instead of being rather elongate; and (d) terminal processes bearing curled, blunt hooks sometimes occur on the statoblasts. Another seemingly important difference, namely, the relatively poor development of the ectocyst in the type specimen, may very well be artificial, for structures of the kind, however carefully they may be preserved, invariably shrink in spirit. The fact that the colony described from Australia was more complex and larger than those I found in Bhim Tal, may be simply a question of age or nutrition.

Rousselet (*op. cit.*) has proposed to put *L. ledenfeldi* in Julien's genus *Hyalinella*, the status of which is very doubtful, my own opinion being that it is unnecessary to separate this genus from *Plumatella*. If Kraepelin (*Deutschen Süßwasser-Bryozoen*,

1887) is right, as I believe him to be, in regarding the forms constituting *Hyalinella* as synonyms of *Plumatella punctata*, Hancock, Rousselet's proposal is open to very grave objections. One of the most characteristic differences between *Lophopus* and *Plumatella* is the comparatively large size of the statoblasts of the former. This is well illustrated by the following table :—

FREE STATOBLASTS.

	Length.	Breadth.
1. <i>Plumatella princeps</i> , Kraepelin = same author's "emarginata, Reihe "	0.36—0.37 mm.	0.2—0.3 mm.
2. <i>Plumatella polymorpha</i> , Kraepelin = same author's "repens, Reihe "	0.214—0.53 ,,	0.2—0.413 ,,
3. <i>Plumatella philippinensis</i> , Kraepelin	0.4—0.471 ,,	0.2—0.413 ,,
4. <i>Plumatella javanica</i> , Kraepelin	0.347—0.420 ,,	0.2—0.260 ,,
5. <i>Plumatella punctata</i> , Hancock	0.4—0.54 ,,	0.27—0.41 ,,
6. <i>Lophopus crystallinus</i> (Pallas)	1—1.3 ,,	0.6—0.7 ,,
7. <i>Lophopus ledenfeldi</i> , Ridley.	0.85—0.95 ,,	0.7 ,,
8. <i>Lophopus ledenfeldi</i> var. <i>indica</i> , var. nov.	0.9—1.1 ,,	0.5—0.6 ,,
9. <i>Lophopus carteri</i> (Hyatt)	(approx.) 0.8 ,,	(approx.) 0.63 ,,
10. <i>Lophopus jheringi</i> , Meissner	1 ,,	0.8 ,,

For the figures as regards species 1, 2, 3, 5 and 6 I am indebted to Kraepelin's *Deutschen Süßwasser-Bryozoen*, and as regards 4 to the same author's account of a new species in *Mitt. Naturh. Museum Hamburg*, xxiii, p. 146; the measurements of the statoblast of the typical *L. ledenfeldi* are taken from Ridley's original description, those of that of *L. carteri* deduced from Carter's figure, and those of *L. jheringi* derived from Meissner's description in the *Sitzb. Nat. Freund. Berlin*, 1892, p. 260. *P. punctata* is not uncommon in Calcutta and its statoblasts here are generally smaller than those from Europe, although their form and proportions agree well with Kraepelin's figures. I have been unable to detect in the ectocyst of this species any trace of the cells characteristic of that of *Lophopus*.

I take the opportunity to note a description of a new Asiatic freshwater Polyzoon, viz., *Pectinatella davenporti*, Oka, described from Japan in the *Zoologische Anzeiger*, vol. xxxi, No. 23, May, 1907. It is noteworthy that in the genus *Pectinatella* one species (*P. magnifica*, Leidy, from America and Europe) has hooked processes on the statoblast; one (*P. davenporti*, Oka, from Japan) has simple processes, while the third (*P. gelatinosa*, Oka, also from Japan) lacks processes altogether.

X.—REPORTS ON A COLLECTION OF
BATRACHIA, REPTILES AND FISH
FROM NEPAL AND THE WESTERN
HIMALAYAS.

By G. A. BOULENGER, F.R.S. ; N. ANNANDALE, D.Sc. ; F. WALL,
Major, I.M.S., C.M.Z.S. ; and C. TATE REGAN, B.A.

INTRODUCTORY NOTE.

The specimens from Nepal recorded in these Reports were collected by Mr. R. Hodgart on behalf of the Indian Museum, which is much indebted to Major J Manners-Smith, V.C., C.I.E., Resident in Nepal, for the assistance given. The specimens from Kumaon were collected at the same season as those from Nepal (in September and October, 1906) by myself, while those from the Simla district were obtained by a native collector and myself in April and May, 1907. The Nepalese localities mentioned are, for the most part, not to be found on any map. They are situated either in the neighbourhood of Katmandu, the capital of the state ; in the Little Nepal Valley, which lies between that in which the capital is situated and the outermost range of hills ; or in the Terai or sub-Himalayan plain. Only one or two specimens come from the last district, the majority being from the first. The specimens from Kumaon represent only two localities, Bhim Tal and Naini Tal, situated respectively at 4,500 and 6,400 feet ; while the Reptiles and Batrachia from the Simla district were caught, within fifty miles of the town, between 5,000 and 9,000 feet, mostly at 5,000 and at 8,000 feet.—N. ANNANDALE.

BATRACHIA.

By G. A. Boulenger, F.R.S.

1. *Leptobrachium monticola*, Gthr.

Locality—Soondrijal, Nepal.

2. *Bufo melanostictus*, Schn.

Localities—Chitlong and Soondrijal, Nepal ; Bhim Tal and Naini Tal, Kumaon ; Kathgodam, foot of the Kumaon hills.

[This is the common Toad in the Nepal Valley, from which there are other specimens in the Museum, and in Kumaon up

to 7,000 feet. I took a solitary tadpole of unusual size in a small pool above Naini Tal in October. As regards shape and dental formula it agreed closely with Flower's figure of a Malayan specimen (*Proc. Zool. Soc.*, 1896, p. 911, pl. xlv, fig. 3). Although this species has been recorded from 10,000 feet in Sikhim, the closely allied *B. himalayanus* is much more abundant in the Darjiling district between 5,000 and 7,000 feet.—N. A.]

3. *Rana cyanophlyctis*, Schn.

Localities—Soondrijal and Pharping, Nepal ; Bhim Tal and the valley of the Balaya, Kumaon.

[This species is very abundant at the edge of the Bhim Tal (*tal*=lake) and in ditches by the roadside in the lower Balaya valley. In the Naini Tal its place appears to be taken by *R. vicina*. *R. cyanophlyctis* was seen in large numbers at Dharampur (altitude *circa* 5,000 feet) in the Simla hills at the beginning of May and several specimens were captured by my native collector. It has the habit of skipping over the surface of the water when alarmed (*cf.* Boulenger, *Faun. Brit. Ind., Rept.*, p. 450), and although it is usually stated to be an aquatic species, it is only so by daylight ; at night it makes considerable journeys by land. When excavations are made during building operations in Calcutta and are filled by rain water, this frog makes its appearance in them almost at once, even when they are at a considerable distance from any permanent pool.—N. A.]

4. *Rana vicina*, Stol.

Localities—Naini Tal and the upper valley of the Balaya.

The series of specimens collected by Dr. Annandale removes all my doubts as to the identity of *R. blanfordi*, Blgr., and this species (*cf.* Boulenger, *Ann. Mag. Nat. Hist.* (7), xvi, p. 640, 1905). The web between the toes may extend, as a fringe, to the disc of the fourth toe ; the tympanum may be more or less distinct ; the tongue is but feebly notched behind, as noticed by Stoliczka ; internal vocal sacks are present in the male.

[Common at the edge of the Naini Tal and in pools by the roadside in the Balaya Valley above 5,000 feet. It is largely aquatic in its habits, at any rate during the daytime. Specimens taken at the beginning of October appeared to be breeding ; the females contained large ova, while the throats and thighs of the males were suffused with a bright claret-colour, which soon disappeared in spirit. In no example seen were nuptial excrescences developed. Specimens were also taken at the end of April in a small pool of a stream, the greater part of which had dried up, at Matiana (altitude 8,000 feet) in the Simla district. With them were tadpoles, probably of the same species. The tadpoles had large suctorial lips similar to those of the tadpole of *R. liebigii*, from which, however, they differed in dental formula.—N. A.]

5. *Rana tigrina*, Daud.

Localities—Soondrijal and Katmandu, Nepal (4,000 to 5,000 feet).

6. *Rana limnocharis*, Boie.

Localities—Soondrijal, Nepal ; Bhim Tal, Kumaon.

[A specimen was also taken at Dharampur in the Simla hills in May.—N. A.]

7. *Rana formosa*, Gthr.

Locality—Soondrijal, Nepal.

LACERTILIA.

By N. Annandale, D.Sc.

The collection includes examples of nine species of this group, of which species two are new. The others are common Himalayan forms, the distribution of which is rendered considerably clearer by these specimens. The occurrence of the two allied skinks *Lygosoma himalayanum* and *L. sikkimense* in the same locality is of interest ; while the eastern limits of the range of *Agama tuberculata* can now be fixed with tolerable certainty.

1. *Hemidactylus nepalensis*, sp. nov.

One male specimen from Katmandu, Nepal : altitude 4,500 feet. Reg. No. Ind. Mus. Reptiles, 15779.

Diagnosis—

Allied to *Hemidactylus platyurus* (Schneid.) and to some extent intermediate between this species and *H. garnotii*, D. and B.

Head and body depressed ; tail slender, flat, tapering, denticulated at the edges. A distinct fold of skin along the sides, measuring about 1 mm. in breadth, and another along the hind limbs posteriorly. Head long, slender, the length of the snout slightly exceeding the distance between the eye and the external ear ; the extremity of the snout rounded. Toes webbed at the base ; all the digits well developed. Dorsal surface of head and body covered with minute rounded tubercles which are almost homogeneous, but are smaller on the snout than elsewhere ; dorsal surface of tail covered with minute imbricating scales ; subcaudals large ; ventral surface of belly covered with small imbricating leaf-shaped scales (about thirty in a transverse line across the middle of the body) changing gradually into minute tubercles on the throat. Nostril between the rostral and three small scales ; eight upper and eight lower labials ; one pair of chin shields meeting behind the mental and followed by several small scales on either side. An almost straight series of thirty femoral and præanal pores interrupted in the middle line. Three lamellæ under the inner, and seven under the middle posterior digit ; four under the inner, and six under the

middle anterior digit. The dorsal surface pale grey, marbled with a darker shade ; the ventral surface immaculate white.

Length of head	13 mm.
Breadth of head	8 „
Length of body	33 „
Length of tail	45 „
Breadth of tail at base	5 „
Length of anterior limb	12 „
Length of posterior limb	18 „

I take this opportunity to figure another Himalayan Gecko (*Gymnodactylus himalayicus*) recently described by me (*Journ. Asiat. Soc. Bengal*, 1906, p. 287).

2. *Acanthosaura major* (Jerd.).

I took a fine male of this rare species just outside the town of Simla at an altitude of about 8,000 feet. The coloration was very bright but otherwise agreed with the published descriptions ; there was a patch of pale lilac scales under the throat. The lizard was sunning itself on a bare bank by the roadside and appeared to be very sluggish.

3. *Acanthosaura kumaonensis*, sp. nov.

Several specimens of both sexes from Naini Tal and Mussoorie. Type Reg. No. Ind. Mus. Reptiles, 15755.

Diagnosis—

Small, slight ; the body feebly compressed ; the tail more than twice as long as the head and body, hardly compressed ; the adpressed hind limb reaching the tympanum. Snout slightly longer than the diameter of the orbit ; canthus rostralis and superciliary ridges angular ; forehead sloping, slightly concave. Dorsal and medial crests continuous, reduced in both sexes to a single row of strongly keeled scales ; no parallel rows of keeled scales on the back or sides. Scales on dorsal surface of head of different sizes, strongly keeled, not enlarged on the superciliary regions ; six or seven upper and six lower labials ; dorsal and lateral scales of two kinds, *viz.*, large, lozenge-shaped, strongly keeled tubercles and smaller imbricating scales with much feebler keels, the two being mingled irregularly ; ventrals leaf-shaped, imbricate, strongly keeled, larger than throat scales ; caudals strongly keeled, imbricate, of different sizes above, slightly enlarged below. Dorsal surface and sides marbled and blotched with various shades of grey and brown, with a series of large, dark angular marks on the mid-dorsal line ; a broad, dark triangular band extending from the eye to the ear, its apex directed towards the eye ; upper and lower lips vermiculated with black, belly white, sometimes sprinkled with minute

black dots ; a small triangular patch of bright blue on the throat of the male (in October).

	♀	♂
Length of head	18 mm.	15 mm.
Breadth of head	12 „	10 „
Length of body	44 „	37 „
Length of tail	126 „	110 „
Length of hind limb	40 „	35 „
Length of fore limb.	26 „	22 „

Remarks—

I have known this lizard, which appears to be not uncommon in the neighbourhood of Naini Tal and Mussoorie, for some time but have hitherto regarded it as the young of *A. major*, from which it is really quite distinct. It is allied to *A. dymondi*, Boulenger, from which it is readily distinguished by the absence of parallel rows of keeled scales on the back. There are female specimens in the Museum, taken at Mussoorie in September or October, containing eggs. The only individual I have seen in life was a male ; it was caught climbing a tree in a garden in the town of Naini Tal. Another male was taken by Mr. L. L. Fermor at an altitude of about 6,000 feet in the same district. The species has evidently a restricted range, which probably does not extend beyond those parts of Kumaon and the Mussoorie district situated at moderate elevations.

4. *Acanthosaura tricarinata* (Blyth).

A single specimen from Chandragiri, Nepal : altitude 8,000 feet.

The dorsal surface of fresh specimens of this lizard has a livid green colour, which generally fades in spirit to greyish blue. The species is not uncommon at an altitude of 5,000 to 6,000 feet in British Sikhim.

5. *Calotes versicolor* (Daud.).

Several specimens from Katmandu.

This common species has a somewhat extensive range in the Himalayas. In British Sikhim it occurs at least as high as 7,000 feet, and I have seen it at about the same altitude in Kumaon. It is common at 5,000 feet in the Darjiling district and in the neighbourhood of Bhim Tal at a slightly lower altitude. Specimens from the Himalayas are generally small and have a somewhat depauperated appearance, the sexual characters being rather feebly developed ; but it is not always possible to distinguish between such specimens and examples from Lower Bengal. A female was found in May at Kurseong (5,000 feet) whose oviduct contained large eggs still devoid of a shell. In Calcutta the young are hatched at the beginning of the rains and apparently take at least two years to reach sexual maturity. The breeding season is in progress as early as April.

6. *Agama tuberculata*, Gray.

Several specimens from Chitlong, Little Nepal Valley, and two from near Simla (8,000 feet).

In Kumaon this species is common as low as 4,000 feet, and I have seen it even lower. It has been taken, however, in the western Himalayas as high as 12,000 feet. It would appear to range considerably further east in the Himalayas than any other species of the genus ; but *Agama himalayana*, which was originally described from Ladak, is found, north of the hills, in the Lhasa district. Despite the fact that it must be able to endure a very low temperature when hibernating during winter, *A. tuberculata* is sensitive to cold while active. It is found as a rule on bare rocks, and even on the walls of houses, on which the sun is shining. Even a passing cloud causes it to retire immediately. The posterior surface of the thighs and the throat were suffused with sky-blue in male specimens taken (both in Nepal and in Kumaon) in September and October. The young are apparently hatched at that time of year in Nepal.

We have long had in the Museum specimens of the species from Kashmir and from Quetta. The species is abundant in the Simla hills, but specimens from this district differ in colour from those taken in Kumaon and Nepal. In the eastern race the dorsal surface is of a very dark slate-colour, with numerous spots and blotches of yellow ; while in the Simla form the back is of a rather pale brownish-grey with fewer and less conspicuous spots. The Simla form is more wary and agile than the eastern one.

7. *Mabuia macularia* (Blyth).

A single specimen from the Terai (sub-Himalayan plain) near Raxaul.

8. *Lygosoma sikkimense*, Blyth.

Numerous specimens from Chitlong, Little Nepal Valley, and one from Katmandu.

This species appears to be as common in the Little Nepal Valley as it is in British Sikkim. There is no evidence that it ranges further west than Nepal and it is certainly replaced in Kumaon by *Lygosoma himalayanum*. I recently recorded a specimen from Simla (*Journ. Asiat. Soc. Bengal*, 1905, pp. 146, 149), but a re-examination of this specimen which is in a bad state of preservation, convinces me that I was wrong in my identification. *L. sikkimense* is fond of sunning itself on stones and dry paths.

9. *Lygosoma himalayanum* (Günth.).

A single specimen from Chitlong.

This specimen (plate vi, fig. 3) is not quite typical. Its total length is 168 mm., of which the tail accounts for 108 mm. ; the colours are brighter than usual and the longitudinal streaks more conspicuous, but it is difficult to find any very definite difference

in this respect. There are no projecting lobules or granules at the edge of the ear opening. On the whole, I cannot say that there is any distinction between this specimen and others from further west which would justify its being regarded as representing even a local race; but it is certainly larger and brighter than the majority of specimens I have examined. It has thirty scales round the middle of the body. The "obscure dark edging" of the ventral scales of this species to which I have referred in the paper cited above, appears to be entirely due to bad preservation of the specimens examined. *L. himalayanum* is by far the commonest skink in Kumaon between 4,000 and 7,000 feet. There are specimens in the Indian Museum said to come from the plains, but their history is one which has proved untrustworthy in other instances and I think that the locality attributed to them is incorrect. The habits of *L. himalayanum* differ somewhat from those of *L. sikkimense*, as the former appears to avoid the sun and is often found in rather damp situations. It is very abundant on the banks of the lake at Naini Tal (6,400 feet) and in gardens in the town of Simla, in the neighbourhood of which it is common at least as high as 9,000 feet. Males taken in this district in April and May had a lateral stripe of orange or bright reddish-brown running along the body below the dark lateral band. This conspicuous stripe was absent from females taken at the same season and from specimens of both sexes examined in Kumaon in autumn. The oviducts of the females contained eggs in May but not in September.

EXPLANATION OF PLATE VI.

FIG. 1.—*Gymnodactylus himalayicus*, Annandale.

FIG. 2.—*Hemidactylus nepalensis*, sp. nov.

FIG. 3.—*Lygosoma himalayanum* (Günther), from the Little Nepal Valley.

FIG. 4.—*Lygosoma sikkimense*, Blyth, from the same locality.

OPHIDIA.

By F. Wall, Major, I.M.S., C.M.Z.S.

I am indebted to Dr. N. Annandale for giving me an opportunity of examining a small collection of snakes from Nepal, and permitting me to make the following remarks upon them.

Among the twenty specimens, eleven species are represented, most of which are common.

The names used are those applied by Boulenger in his *Catalogue of Snakes in the British Museum*, 1893-96.

The specimens are as follows :—

1. *Python molurus*.

The head and part of the body are preserved of a small example from Bichiakoh, Nepal Terai.

[Occurs at least as high as 5,000 feet in Kumaon, and is said to be found occasionally at Darjiling (6,000 feet)¹.—N. A.]

2. *Tropidonotus piscator*.

There are two examples from Pharping (5,000 feet). These are greenish olive, and somewhat indistinctly chequered, the darkish spots being ill defined and smaller than the interspaces.

[Common in the Bhim Tal.—N. A.]

3. *Tropidonotus platyceps*.

An example from Pharping (5,000 feet). Quite typical.

4. *Tropidonotus stolatus*.

Four examples from Gowchar and Pharping (5,000 feet). Quite typical.

[Common at Bhim Tal.—N. A.]

5. *Tropidonotus chrysargus*.

Two small specimens from Chitlong, Little Nepal Valley, I have little hesitation in referring to this species. They are nearly uniform olive-green in colour, with two white dots on the head, one on each parietal shield. The upper lip is white, abruptly defined above. The labial sutures are not pigmented. In A specimen the chin shields are finely specked with grey; in B purely white. There are some shield differences between the two specimens which, however, I do not consider sufficient to separate them, as they agree in other respects.

A specimen.—Ventrals 173. Subcaudals 80. Nasal shields touch the first supralabial only. Temporals 2 + 2.

B specimen.—Ventrals 184? Subcaudals 88. Nasal shields touch the first and second supralabials. Temporals 1 + 1.

The scales in both are 19 in anterior and midbody, 17 at a point two headlengths before the vent. The labials are 8, with the third, fourth and fifth touching the eye in both specimens.

6. *Trachischium tenuiceps*.

Two quite typical specimens are from Chandragiri (8,000 feet).

7. *Lycodon aulicus*.

One example of Boulenger's Variety D (*Catalogue*, vol. i, p. 353) from Katmandu, Nepal Valley (4,500 feet).

¹ Rai Bahadur R. B. Sanyal tells me that he has seen a specimen killed near the town of Darjiling.—N. A.

8. *Zamenis mucosus*.

There are two specimens, one from Gowchar, the other from Kakani, Nepal.

9. *Dipsadomorphus multifasciatus*.

With little hesitation I refer two specimens obtained from Chitlong to this species.

Both agree in the following ways : The scales are 21 in anterior and midbody, 15 at a point two headlengths before the vent. The vertebral row at midbody is but moderately enlarged. The præocular is well separated from the frontal. The supralabials eight, with the third, fourth, and fifth touching the eye. Temporals two anterior. Posterior sublinguals quite separated by two small pairs of scales. The horizontal diameter of the eye equals its distance from the anterior edge of the nostril. They are both marked with oblique, equidistant, costal dark lines.

A specimen is pinkish-brown, almost dove coloured. The ventrals are 233 and the subcaudals 106 ?

B specimen is pink. The ventrals are 232 and subcaudals 102.

10. *Lachesis monticola*.

Two good examples are from Kakani and Chitlong, and quite typical. In A specimen the scales are 23 in the anterior and midbody, 21 at a point two headlengths before the vent. The ventrals are 153, subcaudals more than 40 (tail imperfect).

B specimen has the scales 23 in the anterior and middle parts of the body, 19 at a point two headlengths before the vent. The ventrals are 148 and subcaudals 48.

11. *Lachesis gramineus*.

One example from Katmandu (4,500 feet). It is uniform green dorsally, with a white flank line continued well on to the tail. The belly is greenish posteriorly, white anteriorly. The ventrals are 170, and subcaudals 57. Scales 21 in midbody.

[Major Manners-Smith tells me that it is a common belief in Nepal that there are no poisonous snakes in that country. In Sikhim and Kumaon, however, the cobra, the hamadryad, and Russell's viper are known to range to a considerable altitude. The only snake which I saw in the Simla district was *Ancistrodon himalayanus*, a specimen of which was killed by my companion Mr. I. H. Burkill at an altitude of about 9,000 feet near Matiana.—N. A.]

FISHES.

By C. Tate Regan, B.A.

The fishes sent by Dr. N. Annandale have been referred to seven species, one of which is new to science.

CYPRINIDÆ.

1. *Barbus ticto*, Ham. Buch., Bhim Tal (lake), Kumaon, 4,500 feet.

2. *Oreinus richardsonii*, Gray and Hardw., Soondrijal, Nepal.

3. *Diptychus annandalei*, sp. n.

Depth of body $3\frac{2}{3}$ to 4 in the length; length of head $3\frac{1}{2}$ to 4. Snout as long as or shorter than eye, the diameter of which is 3 (young) to $3\frac{2}{3}$ in the length of head, and nearly equal to the inter-orbital width. Two barbels on each side, the anterior much shorter than the posterior, which is not, or scarcely longer, than half the diameter of eye. Body nearly entirely naked. Dorsal II 8; origin equidistant from snout (young) or middle of eye and base of caudal, longest ray about $\frac{3}{5}$ the length of head; free edge of the fin straight. Anal II 6, when laid back not reaching the caudal; free edge slightly convex. Pectoral $\frac{2}{3}$ the length of head, not reaching the ventrals, which are inserted below the origin of the dorsal. Caudal forked. Caudal peduncle $1\frac{1}{4}$ to $1\frac{1}{2}$ as long as deep. Greyish; a few dark spots on the sides; a dark lateral stripe; dorsal and caudal dusky, lower fins pale.

Total length, 70 mm.

Pharping, Nepal.

The description is based on three specimens; the species differs from others of the genus in having two pairs of barbels.

4. *Basilius bendelisis*, Ham. Buch., Bhim Tal (lake).

SILURIDÆ.

5. *Saccobranchius fossilis*, Bl., Katmandu.

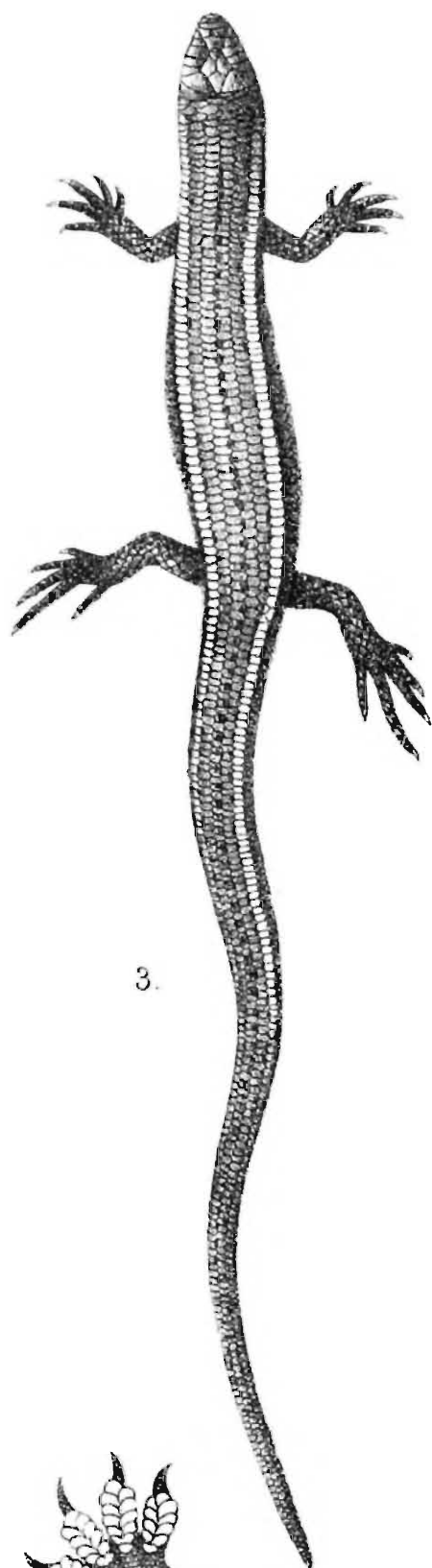
6. *Euchiloglanis blythii*, Day, Pharping.

In a recent paper (*Ann. Mag. N. H.* (7), xv, 1905, pp. 182-185) I have shown that the fishes which have been usually placed in the genus *Exostoma*, Blyth, fall into three very distinct groups which should be regarded as genera. For one of these I revived the name *Chimarrichthys*, Sauv., 1874, but as was pointed out by O'Shaughnessy (*Zool. Record*, 1874) this is preoccupied, and I therefore propose to substitute for it the new generic name *Euchiloglanis*.

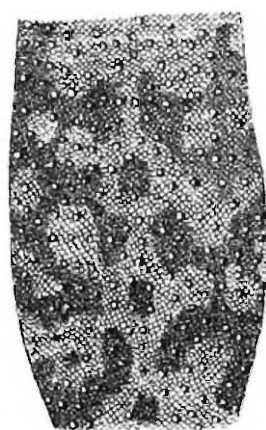
OPHIOCEPHALIDÆ.

7. *Ophiocephalus punctatus*, Bl., Bhim Tal (lake), Pharping and Katmandu.





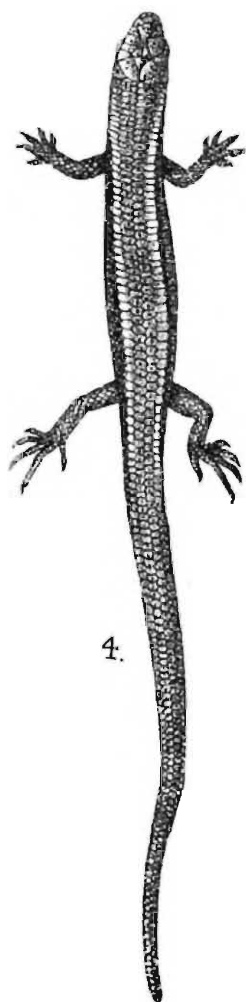
3.



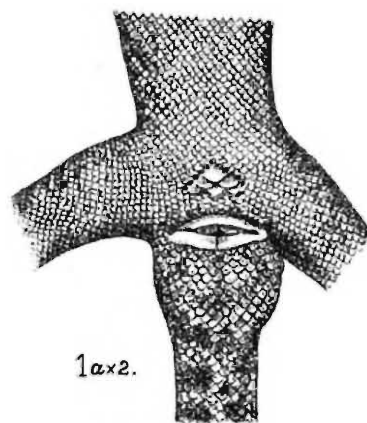
1d x 3.



1.



4.



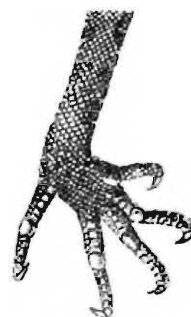
1a x 2.



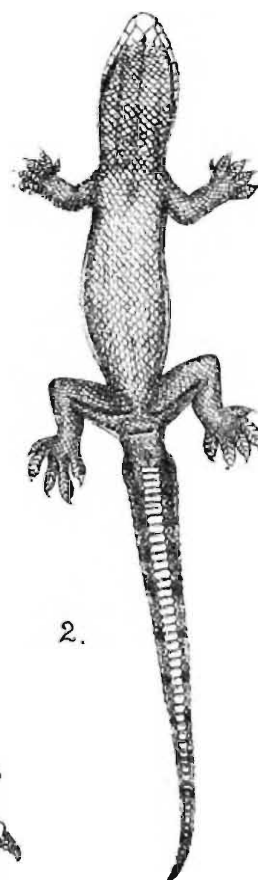
1b x 2.



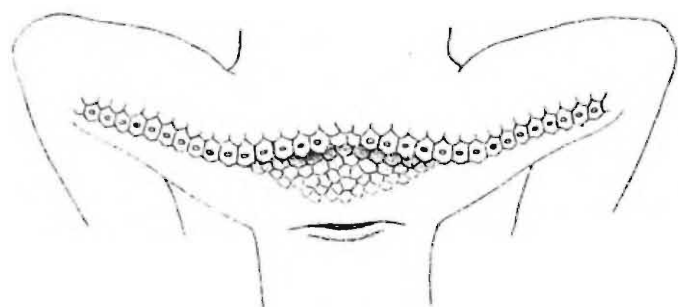
2b x 3.



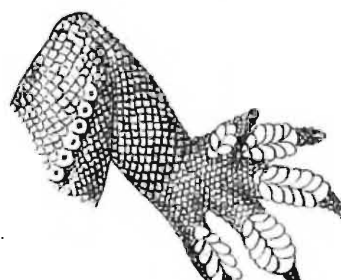
1c x 2.



2.



2a x 4.



2c x 3.

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

PART V.—DEFINITION OF A NEW GENUS OF AMPHIPODA, AND DESCRIPTION OF THE TYPICAL SPECIES.

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

AMPHIPODA GAMMARIDEA.

Family Gammaridæ.

1906. *Gammaridæ*, Stebbing, in *Das Tierreich*, Lieferung 21, pp. 364, 729.

Quadrivisio, n. g.

Eyes four, separate, well developed. First antennæ the shorter, with elongate accessory flagellum. Upper lip with rounded distal border. Mandibles with slender palp, the second joint longer than the first, but not longer than the third. First maxillæ having the inner plate fringed with numerous setæ, the second joint of the palp large. The second maxillæ fringed along the inner margin of the inner plate. Gnathopods subchelate, first pair small, second very large in the male, small and differently constructed in the female. Third uropods much produced, the rami subequal, foliaceous. Telson small, cleft to the base.

By the character, though not by the number, of its eyes, the species for which this genus is instituted, appears at present to be unique. In the Ampeliscidæ four eyes are common, but they are externally simple. In the Synopiidæ and Tironidæ there are species with four eyes, but in both cases the lateral pair are minute, and in *Synopia* the dorsal pair coalesce at the top of the head. In *Hirondellea trioculata*, Chevreux, the number is definitely only three, the dorsal breadth of the head being occupied by one large oval eye, not as in the present instance, finding room for two well separated organs of vision to supplement the fully developed lateral pair.

In other respects the genus has characters already known in the family Gammaridæ, though not in precisely the same combination. The third uropods resemble those in *Megaluropus*, Norman, a genus in several other features very distinct from the present. Sexual difference is here marked by the smaller size of the female and characters affecting the antennæ as well as the gnathopods.

Quadrivisio bengalensis, n.sp.

(Plate VII.)

Head much longer than first segment of peræon, rostral projection minute, ocular lobes rounded. Second and third side-plates rather deeper than first and fourth, the fourth excavate behind for the anterior margin of the bi-lobed fifth. Postero-lateral angles in the large pleon segments 1—3 produced into a very minute tooth. The fourth and one or two other of the pleon segments carry on the hind margin a widely spaced pair of denticles, very small and difficult to observe. The telson is small, not so long as broad, divided to the base, each lobe having several little spines down the inner margin, and some of those round the apex close-set.

Eyes dark, placed near the margin of the head, all with numerous lenses, the lateral pair rounded, the dorsal pair crescent-shaped, with the concavity in front.

First antennæ.—First joint rather stout and long, second much thinner, in male longer than the first, in female subequal to it; third joint small, flagellum nearly as long as peduncle, having in the male more than twenty joints, the long and slender accessory flagellum ten-jointed.

Second antennæ.—Peduncle very elongate, especially in the male, gland-cone prominent, fifth joint in male considerably longer than the long fourth joint, both slightly curved; in the female the fifth joint straight, not longer than the fourth, the flagellum shorter than the peduncle, attaining the number of 17 joints, which is slightly exceeded in the other sex.

Mandibles.—Cutting edge six-dentate, accessory plate stronger on the left than on the right mandible, spines of spine-row numerous, molar strong, palp slight as in *Melita obtusata* (Montagu) and, among the Atylidæ, in *Nototropis swammerdami* (Milne-Edwards); the third joint slightly longer than the second, tipped with two long setæ.

First and second maxillæ.—These show a remarkable resemblance to those of *Ceradocus rubromaculatus* (Stimpson), and present the same difficulty in counting the spines on the outer plate of the first pair, which are not fewer than nine, but may be eleven.

Maxillipeds.—Outer plate not reaching end of palp's long second joint. The third joint of the palp appears to be less elongate in the female than it is in the male.

First gnathopods.—The fifth joint is considerably larger than the sixth, strongly fringed on and near the hind margin with groups of spines planted on the inner surface; the sixth joint oblong oval, with scale-like spinules along the hind margin, and seven rows of spines on the inner surface adjacent to the front margin, the palm very short, transversely rounded, not overlapped by the small finger.

Second gnathopods.—In the male the fourth joint has the hind margin produced to a sharp apex, the fifth joint distally cup-like, not longer than broad, the sixth longer and much broader than the second, with smooth nearly straight front margin, the hind margin slightly setose and denticulate till it meets the very oblique

palm, over which the powerful finger closes, leaving two gaps, a small one near the hinge, a long one near the hind margin, with a squared denticulate process between them. In the female the fifth joint is not cup-like, longer than broad, densely fringed on the hind margin; the sixth joint is not longer than the second, the hind margin and most of the front carrying numerous spines, the palm spinulose, oblique, leaving no gaps between it and the closed finger.

Peræopods.—The first and second pairs are slender, the fourth joint longer than the fifth or sixth. The third pair is shorter than the fourth or fifth; in each the second joint is expanded, but more so in the upper part of the last pair, this joint also having its sinuous hind margin rather more strongly serrate than is the case in the third and fourth peræopods. The fingers are not very large, each with a distinct unguis. The branchial vesicles are simple, large in the second gnathopods and first and second peræopods, diminishing successively in the next two pairs. The marsupial plates are narrow.

Pleopods.—These are narrow, with elongate rami, the inner rami of each pair closely contiguous.

Uropods.—The first pair have the peduncles slightly longer than the equal rami, with a strong spine near the base of the outer margin, and two longitudinal rows of spines; the shorter second uropods have the peduncles about as long as the subequal rami; the third pair extend back much beyond the second, the elongate oval rami being only a little unequal and fringed with numerous little spines and setules; this pair is very easily detachable. Length of male, if straightened out, about 12 mm., female considerably smaller.

Locality.—Port Canning, Lower Bengal, brackish pools. The generic name refers to the fourfold organs of vision, the specific name to the province in which Dr. Annandale discovered this notable species.

EXPLANATION OF PLATE VII.

Quadrivisio bengalensis.

n.s. Line indicating natural size of specimen figured in lateral view.

a.s., *a.i.*; *a.i.* ♀ First and second antennæ of male; second antenna of female.

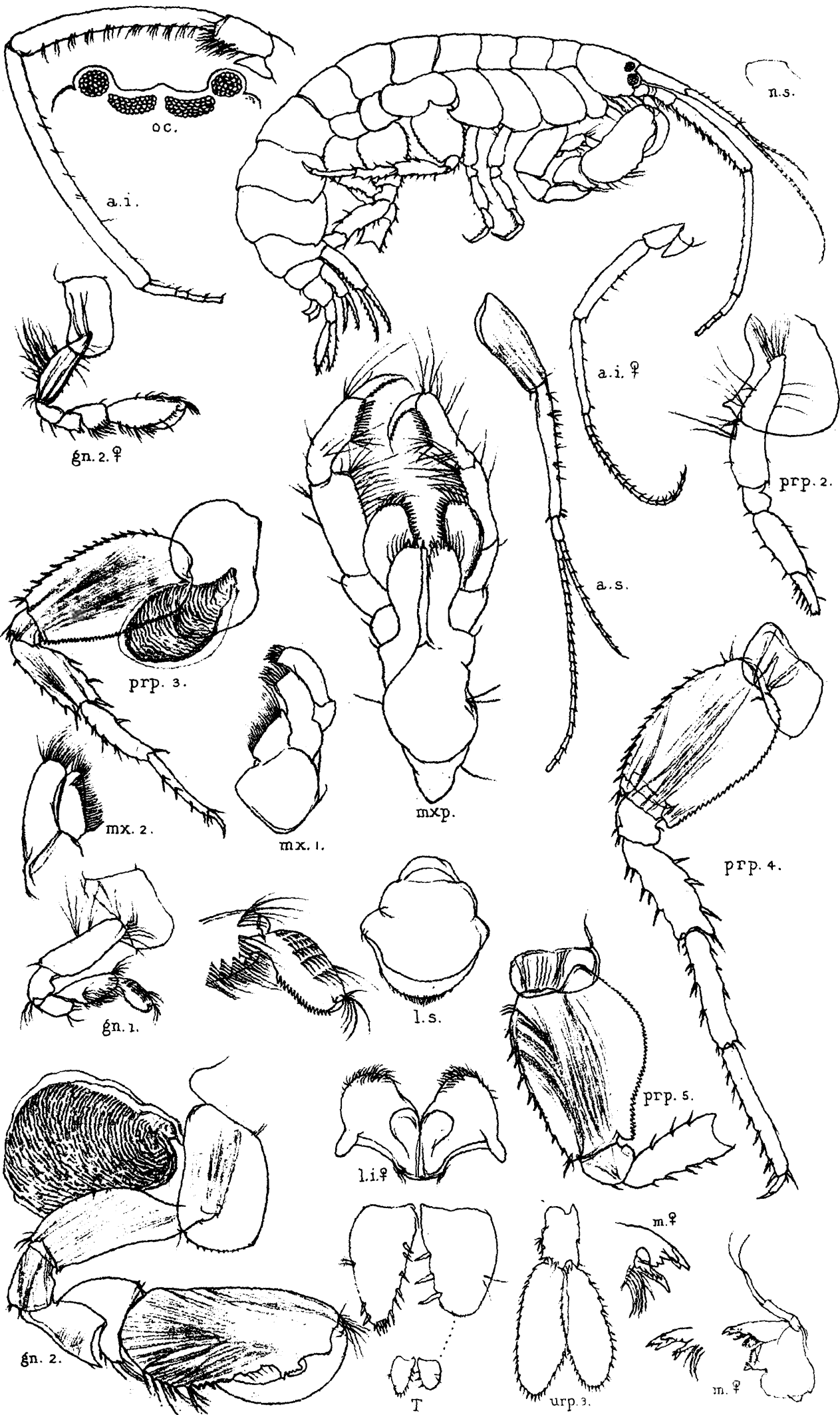
oc. Front of head flattened to show the four eyes.

l.s.; *m.* ♀, *l.i.* ♀; *mx.* 1, *mx.* 2; *mxp.* Upper lip; mandibles and lower lip of female; first and second maxillæ; and maxillipeds.

gn. 1, *gn.* 2; *gn.* 2 ♀; *prp.* 2, 3, 4, 5. First and second gnathopods of male; second gnathopod of female; peræopods, second to fifth, second and fifth incomplete.

T urp. 3. Telson and third uropod.

The mouth-organs, with part of *gn.* 2 and the telson, are magnified on a higher scale than the other details, and parts of the mandibles more highly still.



XII.—NOTES ON ORIENTAL DIPTERA.

I.—NOTE ON *SPHYRACEPHALA HEARSEYANA* WESTWOOD, WITH A LIST OF THE ORIENTAL SPECIES OF DIOPSINÆ.

By E. BRUNETTI.

The capture by Dr. Annandale at Lucknow on April 26th this year of *Sphyracephala hearseyana* in great abundance on the roof of a dry drain, brings it to my memory that on December 4th, 1904, I found the same species in the utmost profusion at the old Residency at that city, where the specimens were clustered very thickly together on the inside walls of the ground floor of that deserted building. On being disturbed, they hovered for a moment or two, and then settled again. The same species was found by me at Cawnpore a few days earlier, there too in extreme profusion, on the shady side of, and beneath, a low arch spanning a nearly dry ditch by the main road. I thought the blackness on the wall was only dirt, until my native servant called my attention to the insects, of which I took a large supply,—this species being the only one I have myself taken in the East.

The short thick eye-stalks easily separate this species (and genus) from all other Oriental Diopsids, except the congeneric *cothurnata* Big., which is separated from it by its wings being marked instead of quite clear as in *hearseyana*.

It would appear that the species of this family are addicted to collecting in swarms on occasion, as Doleschall, writing in 1856, mentions *Diopsis dalmanni* Wied. (*attenuata* Dol.) as swarming over stagnant water at Djokjokarta, Java; while Westwood, still earlier (1837), speaks of *Teleopsis sykesii* Gray (*Diopsis id.* of Westwood) as swarming at Hurreechunderghur, in the Western Ghauts of the Deccan (altitude 3,900 feet); its habitat being woody spots in ravines or woody hillsides, where the flies were to be found clustering together on the rocks illumined by the sun or hovering in such sun rays as pierced the foliage.

Twenty-three species appear to be Oriental, distributed amongst *Diopsis*, *Teleopsis* and *Sphyracephala*, all of which are legitimate genera; but it appears to me impossible, or at any rate inadvisable, to subdivide *Diopsis* or *Teleopsis*, especially on such variable and difficult characters to estimate with certainty as the length of the eye-stalks, thoracic and scutellar spines, etc., as has been done by Rondani in establishing *Diasemopsis* and *Hexechopsis*.

One of the above-mentioned twenty-three species is *Diasemopsis rufithorax* Big., represented by a single example in the Indian Museum Collection; its name appears to be merely a "*nomen nudum*," as I can find no description of it anywhere.

A second species by the same author, the description of which is also untraceable, is *Diasemopsis fenestratus*, likewise in the Indian Museum Collection, but this latter species is certainly only *Diopsis quadriguttata* Wlk.

Besides the truly Oriental species, *Diopsis arabica*, from Arabia, is described by Westwood.

To those who desire to study this very interesting group may be recommended Westwood's monograph of the species known up to 1837 (including *Achias*, a genus now removed from this sub-family to the *Ortalinæ*), published in the Trans. Linnean Soc., Lond., vol. xvii, which volume also contains a short supplement by the same author, giving a few additional species.

In the "*Annales*" of the French Entomological Society, vol. iv (series 5), Bigot gives a list of the known species up to 1874.

Van der Wulp describes the Javan species in *Tijd. voor Ent.*, vol. xl, 181, with a plate. A revision of the synonymy shows some alterations from this author's South Asian Catalogue, and the following list of species incorporates, I think, the latest results:—

DIOPSIS L., 1775, Diss. Upsal.

1. *dalmanni* Wied., 1830. Ausser. Zweifl., ii, 560; pl. x-a, 4.
Also figured by Westwood, Tr. Linn. So., xvii, 309; pl. ix, 17; and pl. xxviii, 8.
(*attenuata* Dol.) 1856, Nat. Tijd. Ned. Ind., x, 413; pl. viii, 2.
(*latimana* R.) 1875, Ann. Mus. Gen., vii, 445.
(*lativola* R.) 1875, Ann. Mus. Gen., vii, 446.
Java, Sumatra Borneo.
2. *confusa* Wied., 1830. Ausser. Zweifl., ii, 563.
(*ichneumonea* F.) 1805, Antl., 201.
nec *D. ichneumonea* L., which is an African species.
Sumatra. Also occurs on the Congo and in Angola.
3. *circularis* Macq., 1835. Hist. Dipt., ii, 486.
Figured by same author in his Dip. Ex., ii, 3, 239; pl. xxxii, 1.
Java.
4. *subfasciata* Macq., 1843. Dip. Ex., ii, 3, 238; pl. xxxii, 3.
Java.
5. *subnotata* Westw., 1848. Cab. Or. Ent., 37; pl. xviii, 2.
(*argentifera* Big.) Ann. Soc. Ent. Fr. (5), iv, 112.
Celebes, Philippines.

Four specimens of this species are in the Indian Museum Collection (one being named by Bigot as his *argentifera*) from Tenasserim, Margherita and Sadiya.

6. *indica* Westw., 1837. Tr. Linn. Soc., xvii, 299 ; pl. ix, 6.
(*westwoodi* De Hann in Westw.) Cab. Or. Ent., 37 ; pl. xvii, 1.
(*apicalis* Dol.) Nat. Tijd. Ned Ind., x, 413 ; pl. ix, 3.
(*graminicola* Dol.) loc. cit., xiv, 417.
Java.
7. *quinqueguttata* Wlk., 1857. Proc. Linn. Soc., i, 36 ; pl. ii, 7.
Mount Ophir ; Borneo.
8. *quadriguttata* Wlk., 1857. Proc. Linn. Soc., i, 37 ; pl. ii, 6.

Specimens of this species are in the Indian Museum Collection from Tenasserim, Margherita, Kurseong and Bhim Tal (4,500 feet), the two specimens from the last locality having been captured by Dr. Annandale between September 19th and 22nd, 1906. Dr. Annandale tells me that the individuals of this and probably other species hover over broad-leaved plants in shady places in the jungle and often alight singly or in pairs on the leaves, on which they run about very much like ants.

Diasemopsis fenestrata Big., the type of which is in the Indian Museum Collection, from Margherita, appears to be a "*nomen nudum*" and in any case it is a synonym of *quadriguttata* Wlk.

9. *discrepans* Wlk., 1857. Proc. Linn. Soc., i, 134.
Borneo.
10. *detrahens* Wlk., 1860. Proc. Linn. Soc., iv, 161.
Macassar (Celebes).
11. *villosa* Big., 1874. Ann. Soc. Ent. Fr. (5), iv, 114.
Borneo.
12. *ferruginea* Roder., 1893. Ent. Nach., xix, 235.
Ceylon.

TELEOPSIS Rond., 1875. Ann. Mus. Gen., vii, 443.

1. *sykesii* Westw., 1837. Tr. Linn. Soc., xvii, 310 ; pl. ix, 18, 19.
(*Diopsis id.* ♂ ♀.)
2. *fallax* Big., 1874. Ann. Soc. Ent. Fr. (5), iv, 111. (*Diopsis*.)
Borneo.
3. *belzebuth* Big., 1874. Ann. Soc. Ent. Fr. (5), iv, 113. (*Diopsis*.)
Borneo.
4. *breviscopium* Rond., 1875. Ann. Mus. Gen., vii, 443.
Borneo.
5. *longiscopium* Rond., 1875. Ann. Mus. Gen., vii, 444.

Borneo. A specimen in the Indian Museum Collection from Tenasserim is probably this species.

6. *fulviventris* Big., 1880. Ann. Soc. Ent. Fr. (5), x, 94.
India. Type in the Bigot Collection.
7. *motatrix* Ost. Sack., 1882. Berl. Ent. Teit., xxvi, 236, fig. 13
(wing).
Philippines.

8. *selecta* Ost. Sack., 1882. Berl. Ent. Teit., xxvi, 236, fig. 13 (wing).
Philippines.
9. *rubicunda* V. der Wulp, 1897. Tijds. v. Ent., xl, 196; pl. viii, 6.
Nias (Java).

In the Indian Museum Collection is a specimen of *Teleopsis* from Tenasserim which does not appear to be any of the described species.

SPHYRACEPHALA Say., 1828. Amer. Entom., iii, pl. 52.

1. *hearseyana* Westw., 1884. Tr. Entom. Soc. Figured by him in Cab. Or. Ent., pl. xviii, 4.

Bengal; Lucknow; Cawnpore. A single specimen from Bhim Tal, taken by Dr. Annandale between September 22nd and 27th, 1906, is in the Indian Museum Collection.

2. *cothurnata* Big., 1874. (5) iv, 115. (*Diopsis*.)
Celebes; Philippines.

Diopsis trentepohlii Westw. in Trans. Linn. Soc., xvii, 546; pl. xxviii, 6, introduced into Van der Wulp's Catalogue as from East India, is an African species (Guinea), as noted in the author's corrections to his Catalogue in Tijds. v. Ent., xlii.

II.—PRELIMINARY REPORT ON A COLLECTION FROM SIMLA

made in April and May 1907

By E. BRUNETTI.

The specimens dealt with in this report are from places of various altitude in the vicinity of Simla, and were captured by Dr. Annandale and his native assistant this year between April 24th and May 8th. In all, there are about 130 species, and, considering the late season, snow still persisting in sheltered spots, this seems a very satisfactory result for a fortnight's work.

The more I see of the Himalayan Diptera, the more I am inclined to consider that it belongs faunistically to the Palæarctic Region, and not to the Oriental, except as regards the lesser heights on the southern side.

I collected a fair amount of material in 1905 and 1906 during two visits to Mussoorie and one to Darjiling, and the Simla material now under examination strikingly resembles my Diptera from the other two localities, all the collections containing a considerable proportion of European species, these latter, moreover, retaining in most cases their typical form. This is conspicuously the case in the present instance as regards the family Syrphidæ, of which, out of twenty-five species captured, I have identified positively ten as commonly distributed European species, showing no varia-

tion whatever, whilst among the unnamed remainder some will in all probability prove to be European also. *Scatophaga stercoraria* L., the very common dung fly of Europe and North America, is not recorded from the East proper, yet it is as common at Mussoorie, Darjiling and Simla as in accepted Palæarctic localities like Hong-kong, Shanghai, Hankow and Japan, in all of which places I found it as abundant as in Europe.

I am hoping to make more extensive studies on the Dipterological hill fauna of India at no distant date, but at present it seems to me that at an altitude of 5,000 or 6,000 feet (almost certainly at 7,000) the Dipterous fauna at least, is much more Palæarctic than Oriental.

The exact localities with altitudes and dates referred to in this report are given first, to avoid repetition after the various species mentioned.

Simla, 7,000 feet, April 24th to 26th and May 4th to 8th.

Theog, 8,000 feet, April 27th and May 1st to 3rd.

Matiana, 8,000 feet, April 28th to 30th.

Phagu, 8,700 feet, May 3rd to 4th.

Dharampur,¹ 5,000 feet, May 6th to 8th.

Of *Mycetophilidæ* about a dozen specimens, representing nearly this number of species.

Bibio obscuripennis Meij. Matiana. In large numbers, first appearing on April 30th near flowering crab-apple trees, on which, however, they did not settle. I found the same species abundant at Darjiling one day in October, 1906, and there is a series from Nepal, also taken in October, in the Indian Museum. This raises the question of the species being possibly two-brooded.

Bibio sp. Three males of a second smaller species, black with reddish legs, black body and clear wings with black stigma.

Plecia melanaspis Wied. One specimen from Theog.

Plecia fulvicollis F. Theog, Phagu. Two females are apparently this species, but the short vein running from the third longitudinal vein to the costa is not so upright as usual, but intermediate between being nearly upright and parallel with the third longitudinal vein. This makes me doubt the identity of these specimens with this species, which is essentially a tropical one, though I have taken it as far north as Meerut. Moreover, the original description says "*alæ obscuræ nigræ*," but Wiedemann in redescribing the species says "wings blackish-brown." The wings of all the specimens I have seen alive or soon after death were obscurely black: perhaps the brown colour is due to age. The old specimens of both this and the previous species in the Indian Museum Collection, have brown wings.

Dilophus, sp. (two specimens). Theog, Phagu. Barely the size of *febrilis*, reddish-brown, with a thin dorsal thoracic stripe and

¹ The specimens from Dharampur were collected by my insect-setter.—N. A.

blackish abdomen above ; black legs with coxæ and basal half of femora (anterior pair, wholly) red.

Simulium indicum Becher. One specimen from Simla is this species, whilst a second, from Phagu, appears to be an undescribed species.

Anopheles sp. (one specimen).

Culex mimeticus Noë. One example, determined by Dr. Annandale. Theog, 2nd May.

Of *Chironomidæ*, which were rather common around water tanks, at least ten species are present, amongst the males ; these being distributed over twenty specimens of both sexes.

The *Tipulidæ* are represented by ten specimens of a prettily wing-marked *Trichocera* and three or four other *Limnobiinæ*, in fair condition. Also by *Pselliophora*, sp. (two specimens), Dharampur ; a large handsome species which is already in the Indian Museum Collection from Nepal, Bhim Tal and Shillong. Though it is so conspicuous a species, I have been unable to identify it with any of the published descriptions.

Rhyphus fenestralis Scop. 4 ♂♂ 4 ♀♀ ; one from Matiana the rest from Simla. Agreeing with the European form of this common species, which occurs generally on windows ; the specimens are slightly larger than usual.

Bombylius major L. 3 ♀♀ ; Matiana and Kodiali (8,400 feet). Two of the specimens (the abdomen of the third is denuded of hair) show a very faint pale dorsal line from the tip of the abdomen nearly to the base. Otherwise they agree exactly with Palæarctic specimens.

Bombylius sp. Dharampur. 1 ♂ with clear wings. The abdomen is denuded, which precludes the possibility of naming the species.

Thereva sp. Theog. 1 ♀ near the European *annulata* but differing sufficiently to make it specifically distinct.

Asilus (sensu lato) 3 ♂♂, 2 ♀♀ ; Theog and Simla. A moderate-sized grey species which might belong to any one of the considerable number of European and Oriental genera described under this genus in its widest sense. Dr. Annandale also took a ♀ of the same species at Lucknow, 21st April, 1907.

In *Empidæ*, three specimens appear to represent *Pachymeria*, *Hilara* and *Tachydromia* respectively.

Dolichopus, sp. 2 ♀♀ ; Matiana.

Pipizella ; a ♂ and ♀ from Matiana probably of the same species.

Chrysogaster sp. 2 ♂♂ ; Matiana.

Melanostoma mellinum L. 2 ♂♂ ; Theog and Simla.

M. scalare F. 1 ♂ ; Matiana. A series of thirteen females from Simla, Theog and Matiana all appear to be the true *scalare*.

M. ambiguum Flu. 1 ♂ ; Matiana.

M. dubium Lett. 1 ♀ ; Matiana. I named this species from "Verrall's British Flies," having no European species at hand to compare it with, but it is noticeable that Verrall records it from an altitude of 3,000 feet in Scotland.

Platychirus albimanus F. 4 ♀ ♀ ; Theog and Matiana. The anterior legs are in most cases a little darker than in normal European forms, but one specimen has them almost entirely pale.

Syrphus pyrastris L. 3 ♂ ♂ 1 ♀ ; Simla and Theog.

S. balteatus De Geer 10 ♂ ♂ 3 ♀ ♀ ; Simla, Matiana, Theog.

S. torvus Ost. Sack. 2 ♂ ♂ 2 ♀ ♀ ; Matiana.

S. luniger Mg. 1 ♂ ; Theog.

S. umbellatarum F. 1 ♂ ; Matiana.

The specimens of the above five species are absolutely identical with European ones. Besides these, there are three ♂ ♂ of a species near *albostriatus* Flu., but certainly not that species—two of them are from Matiana, the other from Simla. Again, there are 9 other specimens of *Syrphus* representing 6 or 7 species, which I have not yet identified.

Chilosia sp. 1 ♂ ; Matiana.

Sphærophoria sp. 6 ♂ ♂ 4 ♀ ♀

Eristalis tenax L. 1 ♂ 2 ♀ ♀ ; Matiana and Theog. Common everywhere, these specimens are of normal type.

Eristalis solitus Wlk. 2 ♂ ♂ 3 ♀ ♀ ; Matiana and Theog.

Whether I have correctly identified the species or not I am not sure, but I have taken it commonly at Mussoorie, Darjiling, in China and Japan, while the Indian Museum Collection contains a good series from various localities in the East (Sikkim, Shillong and Mussoorie).

Rhingia sp. nov. One of each sex of a new species of this genus which I am describing in a subsequent paper on this group. A ♂ of this species exists in the Indian Museum Collection from Darjiling (7,000—12,000 feet).

In addition to the above species there is a single ♂ from Kodiali (8,400 feet) which I am unable to place generically. It is nearest to *Brachypalpus*, but lacks the enlarged posterior femora with spines beneath.

In *Tachinidæ* 13 examples represent 11 species, amongst which one is apparently a *Gonia*.

Sarcophaga is represented by 2 specimens.

In *Muscinæ veræ*, there are *Calliphora vomitoria* L. (1 ♂ 4 ♀ ♀) from Matiana and Simla ; *C. erythrocephala* Mg. (4 specimens) from Simla and Theog ; *Musca domestica* L., ♂ ♀ from Matiana and Phagu respectively.

Anthomyidæ.—I find *Homalomyia canalicularis* L. (5 ♂ ♂ ; Matiana and Theog) ; an *Aricia* (2 ♀ ♀ ; Theog) with all black legs, and a dozen other species amongst the remaining 44 specimens, mostly small *Chortophilæ*.

In *Aca. yperata* I recognise the handsome *Dryomyza maculipennis* Macq. (allied to the *D. formosa* of Japan) ; one specimen having been taken at Simla. I took several of this species near a water tank on the jungly hillside at Mussoorie.

Sepedon plumbellus Wied. (Dharampur).

S. crishna Wlk. Matiana ; a male (28th to 30th April, 1907).

Of *Sepsis* three species are present, a larger one with quite clear wings (3 examples from Phagu), a smaller species with red legs, unfortunately headless (1 example from Matiana), and a third (small) species (10 examples from Matiana, Theog, Dharampur) which Dr. Annandale says is quite common in the district.

Scatophaga stercoraria L. 8 ♂ ♂ and numerous ♀ ♀, all from Simla. These show no variation from European specimens.

Amongst the remaining Acalypterata there are *Chloropinæ*, 4 spp.; *Borborinæ*, 3 or 4 spp., *Geomyzinæ* (? *Geomyza*, 3 examples of a species with 3 small spots on the wing); whilst fifty other specimens represent probably quite half that number of species.

Phoridæ.—2 specimens (1 species) of *Phora*.

MISCELLANEA

REPTILES.

THE OCCURRENCE OF THE 'TAUKTE' LIZARD (*Gecko verticillatus*) IN CALCUTTA.—In Boulenger's volume on the Reptiles and Batrachians in the *Fauna of British India* the distribution of *Gecko verticillatus* is given as "Eastern Bengal to Southern China and the Malay Archipelago," while Anderson, in his account of the Reptiles of Upper Burma and Yunnan, says that it is found in the neighbourhood of Calcutta. It has taken me two years to obtain definite confirmation of the latter record by obtaining a specimen, although Rai Bahadur R. B. Sanyal, the Superintendent of the Calcutta Zoological Gardens, tells me that it is not uncommon in certain large and shady trees in these gardens, in which several specimens have recently been captured for exhibition to the public. My own specimen was taken by my assistant, Mr. C. Vaillant, in another part of the suburbs. The species differs very greatly in its habits in different localities; for while in Bangkok and in some parts of Burma it is common inside even brick dwelling-houses, in the northern part of the Malay Peninsula it is practically confined to the trunks of palm trees in the village groves, and in Calcutta it is extremely shy and wary, hiding itself in the densest foliage. In Singapore, from which several specimens are recorded, the species appears to have been introduced accidentally, probably on ships, as it does not occur in the southern part of the Malay Peninsula, and it is very possible that its occurrence in Calcutta is equally fortuitous.

N. ANNANDALE.

THE DISTRIBUTION OF *Kachuga sylhetensis*.—This tortoise appears to have been recorded hitherto only from Assam, but a specimen was brought me last winter at Rajshahi, a place situated in the new province of Eastern Bengal and Assam but lying almost due north of Calcutta. This extends the known range of *K. sylhetensis* considerably further to the west.

N. ANNANDALE.

BATRACHIA.

THE DISTRIBUTION OF *Bufo andersoni*.—This toad appears to occur over the whole of northern peninsular India as well as in Arabia, although the localities given by Boulenger, *viz.*, Agra, Rajputana and Sind, are all towards the north-west, in which it is most abundant. I recently took a specimen at Rajshahi in Eastern Bengal and there is another in the Indian Museum (quite

characteristic) from Purneah. The species is very common at Lucknow, where I found numerous adults and young, many of the latter still with remnants of a tail, towards the end of April. *B. andersoni* is the only toad which I have seen from the Simla hills, in which, above 7,000 feet, the only common Batrachian appears to be *Rana vicina*; *R. breviceps*, *R. cyanophlyctis* and *R. limnocharis*, occurring at lower altitudes. I have no information how high the present species ranges, but there is a specimen labelled Simla (the town, 7,000 feet?) in the Museum. I did not see it myself in the district, and natives of Theog (8,000 feet) told me that the only frog (or toad) they knew lived in the water.

N. ANNANDALE.

INSECTS.

NOTE ON *Rutilia nitens*, MACQ.—Seven specimens of this brilliant Dexiid (including only one ♂) in excellent condition were captured by the Museum Collector at Phularia, Nepal Terai, on May 5th, 6th and 7th, this year. The genus is the handsomest of all the Muscidae and contains some of the largest species, eighteen of which are recorded from the Orient, but only the present one from India. It was not known hitherto from what part of India *R. nitens* came. The specimens agree almost exactly with Macquart's description. *Rutilia* is mainly an Australasian genus, but extends to some of the East Indian islands. From Victoria and Queensland I possess several splendid species of very large size, but at present I have not attempted to identify them.

E. BRUNETTI.

RECORDS OF SOME INDIAN CERAMBYCIDÆ.—The recent publication of Mr. C. J. Gahan's volume on the Cerambycidae in the *Fauna of British India* has made it possible to identify some of the more conspicuous specimens of that family lately acquired by the Indian Museum.

The large *Acanthophorus serraticornis*, Oliv., is recorded by Mr. Gahan only from Southern India. It is, however, far more widely distributed. In the Indian Museum Collection there are specimens from Sikkim; Nowgong; Ramanad (South India); Singhbhoom Forest, Chota Nagpur, where it has been reported to be destructive to Sâl (*Shorea robusta*); and also from the Andamans. It is quite possible that this beetle may be found in any part of India and also in Burma, although there are yet no records of it from the latter country.

Neocerambyx paris, Wied., another comparatively large beetle of the same family, is by the same authority recorded from Mysore, Bangalore, Burma, Siam and Singapore. In November 1906 a characteristic specimen was obtained in Calcutta by the Museum Collector. The Indian Museum now possesses specimens from Calcutta, Maldah and Bangalore.

Lophosternus indicus, Hope, was obtained by me in May 1906 in the Purneah District. This is the only specimen yet recorded

from the plains. Those recorded by Mr. Gahan are from Nepal, Bhutan and Sikkim. Similarly *Lophosternus falco*, Thoms., which I obtained in the Purneah District in May 1906, has been recorded only from Darjiling.

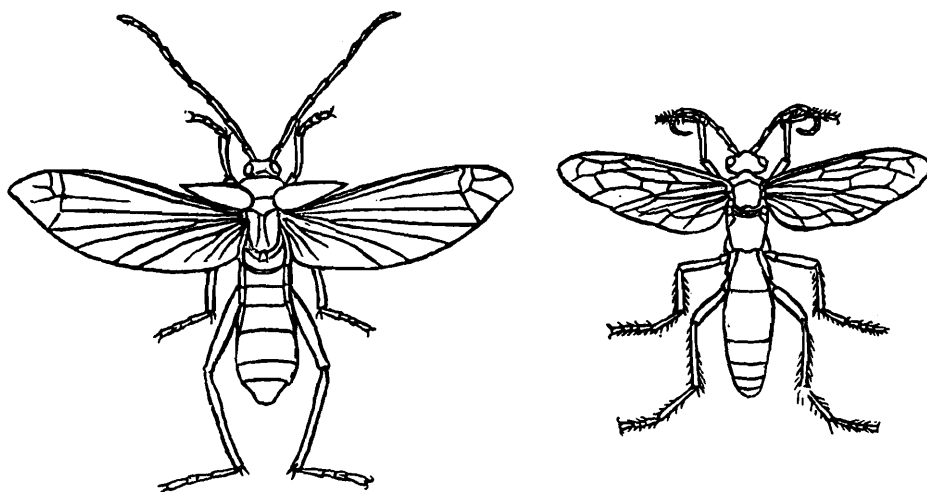
A single specimen of *Prionus elliotti*, Gahan, was obtained by Mr. E. Vredenburg of the Geological Survey of India in the Nushki District, Baluchistan, in May. The specimen recorded by Mr. Gahan is from Baluchistan, near Quetta (*C. Elliott*).

Three specimens of *Æolesthes holosericea*, Fabr., were obtained by the Museum Collector in Calcutta in January 1907. Mr. Gahan records the species from North-West India, Bombay, the Nilgiris, Ceylon, Assam, Tenasserim, the Andaman and Nicobar Islands, Siam, and the Malay Peninsula. It apparently is a very widely distributed species.

Æolesthes sarta, Solsky, has hitherto been recorded from Quetta (*E. P. Stebbing*), Turkestan and Western Tibet. The Indian Museum possesses one specimen collected by Mr. E. Vredenburg in the Nushki District, Baluchistan. In the Annual Report of the Board of Scientific Advice for India for the year 1905-06, p. 108, there is a short account, by Mr. E. P. Stebbing, of the damage done by the larvæ of this beetle to the trees forming the avenues in Quetta, where it is doubtless exceedingly common. Mr. Stebbing gives an interesting life-history of this beetle in his pamphlet entitled the "Quetta Borer." He also records it from Chagai, Chaman and Seistan.

One specimen of *Rosalia lateritia*, Hope, was presented to the Indian Museum by Mr. L. L. Fermor of the Geological Survey, who obtained it in Kumaon in October, 1906. There was only one other specimen in the Museum Collection, from Kulu. Mr. Gahan records it from the Himalayas, Travancore, Burma, Indo-China.

Another Cerambycid Beetle, *Nothopeus hemiptera*, Oliv., is worthy of note, not only on account of its distribution, but also on



Nothopeus hemiptera and *Salix madraspatanus*.

account of its close resemblance to certain other insects. It resembles the common Pompilid Hymenopteron *Salix madras-*

patanus, Smith, in a very striking manner, especially when its wings are spread out. It also resembles the boring bee *Xylocopa fenestrata* Fabr., not in form and size but in colour. Mr. Gahan records it from North India, Burma, Java. The specimen in the Indian Museum Collection was obtained in Calcutta in 1905.

C. A. PAIVA.

NOTES ON SOME INDIAN HEMIPTERA.—Dr. N. Annandale, during a recent visit to Simla, obtained one specimen of *Bagrada picta*, Fabr., at Theog, 8,000 feet, Simla hills, on the 2nd May 1907. He states that it is rather scarce in the Simla district. A few specimens were found by the collector who accompanied him, at Dharampur (5,000 feet) in the same district and month. Mr. Hodgart obtained one specimen at Nagla in the Naini Tal district in March 1907. It appears to be found all over India.

On April 28th a specimen of *Palomena reuteri*, Dist., was found by Dr. N. Annandale feeding on a Poplar tree at Matiana, 8,000 feet, Simla hills.

The only specimen now in the Indian Museum Collection of *Lelia octopunctata*, Dall., was obtained by Dr. N. Annandale at Matiana, 8,000 feet, Simla hills, on the 30th April 1907. It has been hitherto recorded from Bhutan (*British Museum*) and the Khasi Hills (*Chennell*).

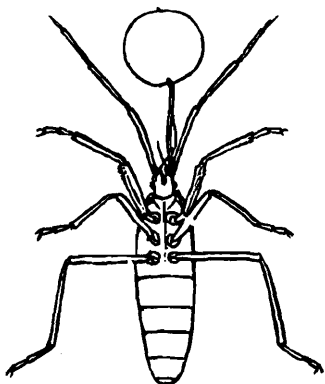
One specimen of *Mictis macra*, Stål., which has hitherto been represented in the Indian Museum Collection by five specimens from Mergui, was obtained by Mr. R. Hodgart at Phularia, Nepal Terai, in May 1907. Mr. Distant, in his volume on the Rhynchota in the *Fauna of British India*, records it from Sylhet (*Stockholm Museum*) and mentions that it is also found in the Malay Peninsula. It appears to be rather rare in India.

In March 1907 quite a number of specimens of *Clavigralla gibbosa*, Spin., were brought to the Museum by the Museum Collector. This species seems to abound on a plant which Mr. I. H. Burkill has identified as the composite herb *Blumea wightiana*, DC. *Clavigralla gibbosa* is recorded by Mr. Distant from Bombay (*Distant Collection*); Bangalore (*Cameron*); Tenasserim, Myitta (*Doherty*). Mr. R. Hodgart collected a specimen at Bijaura, Nepal Terai, in May 1907. It is apparently widely distributed.

Several specimens of *Lygæus equestris*, Linn., from Murree, Punjab, are in the Museum Collection. Dr. N. Annandale found it very common on bare and grassy hillsides in the Simla district, above 7,000 feet. It is very active on the wing. The specimens obtained by Dr. Annandale are from Theog, 8,000 feet (27th April 1907), and Matiana, 8,000 feet (28th April 1907).

Macropes dilutus, Dist., was hitherto unrepresented in the Indian Museum Collection, but in January 1907 Mr. R. Hodgart obtained three specimens at Bijnor, United Provinces. This appears to be the only definite locality in India proper from which the species has yet been recorded. Mr. Distant records it from "North India" (*Distant Collection*); Burma: Bhamo (*Fea*).

In February 1907 the Museum Collector obtained a young specimen of the Giant Cotton Bug, *Lohita grandis*, Gray, with a seed-like object, about the size of an ordinary pea, attached to its rostrum; and although the insect received a good deal of handling, the object remained suspended to the rostrum. Mr. I. H. Burkill,



Young *Lohita grandis* sucking seed of *Ipomœa*.

of the Industrial Section of the Indian Museum, identified the seed as that of a species of *Ipomœa*. Its shell is very hard; no impression can be made on it with an ordinary knife, and it appears wonderful how such a small insect could have thrust its proboscis into the seed. On careful examination of several seeds of the same kind, I found, on one side of the seed, a very small raised spot, with a slight depression in the centre. This is the only penetrable part in the seed and is doubtless the part the bug chooses for the insertion of its proboscis.

A few specimens of *Dermatinus lugubris*, Dist., were collected by Mr. R. Hodgart at Bareilly, United Provinces, and at Songara, Gonda district, in March 1907. Hitherto there was only one specimen of this species in the Museum Collection, from Chatrapur, Ganjam district. Madras and Pondicherry are the only localities recorded by Mr. Distant.

One specimen of *Gerbilius ornatus*, Dist., was obtained by Mr. R. Hodgart at Nagla, Naini Tal district, in March 1907. This is the only specimen now in the Museum Collection. Mr. Distant records it from Bor Ghat (*Dixon*) and Ceylon (*Green*).

Vesbius purpureus, Thunb., is recorded by Mr. Distant from Assam, Khasi Hills (*Distant Collection*); Ceylon (*Green*); Burma: Bhamo (*Fea*); Java; Philippines. On the 3rd March 1907 the Museum Collector obtained one specimen in Calcutta. There are two others in the Museum Collection, one from Calcutta and the other from Margherita, Upper Assam.

Specimens of *Salda dixonii*, Dist., were found to be very common at Theog, 8,000 feet, Simla hills, at the beginning of May 1907, by Dr. N. Annandale, who states that they are abundant there at the edge of a pond, and are very active, jumping about and taking to the wing readily, but never flying far. They are able to run and leap on the surface of the water. Mr. Distant considered this species rare, as he says in his volume on the Rhynchota in

the *Fauna of British India*, that he had seen but two specimens, one sent him by Mr. R. M. Dixon from Bor Ghat, Bombay, and another collected by Signor Fea at Rangoon.

C. A. PAIVA.

CRUSTACEA.

A PREOCCUPIED SPECIFIC NAME IN *Macrothrix*.—In reference to a species described in his recent paper (*Rec. Ind. Mus.*, I, p. 25, June, 1907) on Indian Freshwater Entomostraca, Mr. R. Gurney writes under date June 7th, 1907, as follows: "I find that I have used in my last paper a name already used, viz. *Macrothrix tenuicornis*. Kurz used it many years ago for *M. rosea*. If possible, will you change the name of my species to *Macrothrix odiosa*." Unfortunately the letter arrived after the paper had been issued, but *Macrothrix odiosa* should stand as a correction.

MOLLUSCA.

AN ENEMY OF CERTAIN PEARL OYSTERS IN THE PERSIAN GULF.—A number of specimens of Pearl Oysters from the Persian Gulf have recently been sent to the Indian Museum for identification; they belong to the three species mentioned by Evans in the *Proc. Roy. Phys. Soc. Edinburgh* for 1892, namely, *Avicula macroptera* (local name *zanni*), *Meleagrina vulgaris* (local name *muhar*), and *M. margaritifera* (local name *sadifi*), the last representing Jamieson's var. *persica*. Nearly all the shells of *A. macroptera* and a few of those of *M. margaritifera* had been injured by the burrows of a mussel, which Mr. H. B. Preston has identified as *Lithodomus malaccanus*, Reeve. The burrows in the shells were not vertical, but nearly horizontal; they were cylindrical, rounded at the end and not much longer than the mussel. Their diameter was, however, sufficiently great to have injured the inner layers of the pearl shell in many instances and to have caused the deposit of irregular masses of dark nacre on the internal surface. The outer layer was generally more or less broken above the burrows and in such places had almost invariably been attacked by the boring sponge *Clione*. The mussel itself had in some cases been attacked by another borer, which had made comparatively large circular holes in one of its valves. *Lithodomus malaccanus* is not mentioned by Herdman among the enemies of the Ceylon Pearl Oyster, although it is known to occur in the Gulf of Manaar; it is recorded doubtfully by Melvill in his list of the shells of the Persian Gulf.

N. ANNANDALE.

THE DISTRIBUTION IN INDIA OF THE AFRICAN SNAIL *Achatina fulica*, FÉR.—It is well known that this gigantic snail, introduced from Mauritius, is common in the gardens of Calcutta and the neighbourhood. As it is said to be spreading to other parts of India, I should be very glad of specimens from any part of the country not in the immediate neighbourhood of Calcutta. The species is easily

recognized by its large conical shell, which measures about $4\frac{1}{2}$ inches in length and is marked with more or less confused longitudinal chocolate stripes.

N. ANNANDALE.

POLYZOA.

STATOBLASTS FROM THE SURFACE OF A HIMALAYAN POND.—During a recent visit (in April and May) to the Simla district in the Western Himalayas I made a careful examination of the surface of all ponds, wells and streams I came across, in the hope of finding floating sponge gemmules or polyzoon statoblasts. So much dust is blown up from the plains of the Punjab into the hills that I rather expected to find these bodies on the water, even if the organisms which produce them did not occur. In almost every case but one, however, my search was fruitless, although at first sight I took for gemmules certain bodies which were probably the egg-shells of the Phyllopod Crustacean *Branchinecta orientalis*, Sars. On the horse-pond at Theog, a village situated at an altitude of 8,000 feet about seventeen miles beyond the town of Simla, I found in a scum of animal and vegetable debris numerous statoblasts agreeing in every respect with those of the typical *Plumatella emarginata*, and although I was unable to find living colonies of this animal, it is possible that they existed on certain stones near the centre of the pond that I was unable to reach. Together with the statoblasts were certain other bodies which may be those of some unknown species. Each contained two brownish capsules, which were approximately circular in outline and were enclosed in a mass of air-cells. One edge of the whole structure was straight while the other was curved. I know of no species to which they can belong. Similar bodies were also found on the surface of a small pond above the village of Phagu, at a point about five hundred feet higher than Theog and five miles nearer Simla.

N. ANNANDALE.

NOTES ON *Hislopia lacustris*, CARTER.—Through the kindness of Dr. N. Annandale, I have recently had the opportunity of comparing a specimen of *Hislopia lacustris* from Calcutta with the same species as it occurs in the United Provinces at Bulandshahr. Dr. Annandale has so fully described this Polyzoan as met with in Calcutta (*Journ. Asiat. Soc. Bengal*, vol. ii, No. 3, March 1906, and *id.*, vol. iii, No. 2, February 1907), that I shall content myself with pointing out in what respects specimens from the United Provinces of India differ from those found, some 700 miles further east, at Calcutta.

Dr. Annandale's observations were made in January and February (*i.e.*, in the "cold weather") at Calcutta, and mine were made in April and May (*i.e.*, at the beginning of the "hot weather") at Bulandshahr; but Dr. Annandale tells me that he has recently examined specimens taken in Calcutta in June and that they do not differ from those taken in February in the same tank.

In Calcutta the species has only been found on the leaves of *Valisneria spiralis*.

In describing the form of the colonies, Dr. Annandale says that, in Calcutta "the linear arrangement is far commoner than any other, but occasionally several zoœcia are adjacent to one another in a transverse series" A somewhat similar arrangement to this "linear" one also occurs at Bulandshahr, though it is much rarer than that next to be described. I have found a few small colonies, of perhaps twenty to thirty zoœcia growing in this way on slender submerged leaves and twigs, where the colony has not room to extend much laterally. But in this part of India (the United Provinces) *Hislopia* is far more frequently found in the form of a flattened encrusting sheath on the outer surface of the shells of *Paludina* and at least one other freshwater Gastropod. This was the condition described originally by Carter (*Ann. Mag. Nat. Hist.* (3), i, page 169).

The colony consists of a single layer of zoœcia, and completely covers the whole surface of the shell with the exception of the narrow surface which lies in contact with the upper part of the protruded "foot" of the Mollusc. Almost every *Paludina* that I have examined carries *Hislopia* about with it, and as *Paludina* occurs very abundantly, *Hislopia* is by far the commonest of the Polyzoa met with in this part of India.

The zoœcium of the encrusting form is of a darker brown colour than the other; in both varieties the colour is most marked at the margin of the orifice.

Carter describes the shape of the zoœcium as "irregularly ovate." This oval shape is decidedly more marked in the encrusting than in the linear form. The orifice always occurs nearer the broad than the narrow end of the oval, and projects further above the surface of the zoœcium in the encrusting form. Very few of my specimens show spines at the orifice, and those that do bear spines have them in a more or less rudimentary condition. As this occurs in large zoœcia, which contain eggs, I cannot think that the absence of spines is a sign of immaturity.

I fully agree with Dr. Annandale's remarks about the nature of the "valves," and my observations do not confirm the statement made by Carter (quoted by Annandale, *loc. cit.*) that the posterior "valve" is larger than the others.

As noticed by Carter and Dr. Annandale, the "collar" is a very conspicuous part of the polypide.

Although when reduced to writing, the differences between the two forms of *Hislopia* do not appear to be very great, I think that if only the dried colonies were available for examination, there would be a strong tendency to regard them as distinct species at least. But the living polypides appear to be identical in form, and there is little doubt that the two quite distinct phases in which *Hislopia* occurs are merely another example of that variability which is well known to occur in other Polyzoa, such as *Plumatella*.

H. J. WALTON, *Capt., I.M.S.*

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