# XX THE LARVAE AND PUPAE OF SOME BEETLES FROM COCHIN.

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(Plates xx-xxi).

## I Cucujidae—*Uleiota indica*, Arrow.

(Plate xxi, figs. 13-19).

The specimens on which the following descriptions are based were found by Mr. B. Sundara Raj under bark at Parambikulam, 1700-3000 ft.

The adult agrees with the description [1] of the species to which I have referred it in every detail, except that the third joint of the antenna is slightly shorter instead of longer than the succeeding ones. In this respect, however, I find it to be in agreement with cotypes from Kanara, presented by Mr. H. E. Andrewes to our collection and to that of the Agricultural Research Institute at Pusa, and with others which Mr. Andrewes very kindly sent me for examination.

### LARVA.

The larva of *U. indica* is whitish in colour, and closely resembles larvae of other species of the genus in general appearance.

The antennae arise from collar-like sockets which Perris (see "Larves de Coléoptères," p. 61) has supposed to represent a distinct segment, making four in all. The first segment beyond this is about half as long as the second, which bears a minute conical process on the inner side of its distal end and is slightly longer and much stouter than the third.

Immediately behind the base of each antenna are five ocelli. Normally four of these appear to be arranged in a row, with the remaining ocellus immediately behind the middle of the space between the upper two. But on one side of one specimen the solitary ocellus is in front of the space between the lower two members of the row.

The apex of the mandibles is strongly bidentate, and is followed by a row of about four small teeth on the inner edge.

The blade of the maxilla is strongly fringed at the apex. The three joints of the maxillary palps are of about equal length, but the

[1] *Trans. Ent. Soc.* 1901, pp. 599-600.

third is much slenderer than the other two. The terminal joint of the two-jointed labial palps is slightly longer and slenderer than the basal.

The anterior margin of the first tergite is convex, overlapping the back of the head. The posterior margins of all segments are straight, both above and below. All segments are distinctly broader than long. The two joints of the appendages of the eighth abdominal segment are distinct as in *U. planatus*, the basal joint being stout and the distal spiniform. The three joints of the appendages of the ninth abdominal segment are more or less completely fused as in *U. serricollis*.

*U. serricollis* is a Ceylonese species and its larva appears to resemble that of *U. indica* more closely than does any other larva yet described.

The larvae at present referred to the genus *Uleiota* may be distinguished from one another as follows:—

| | | |
|---|---|---|
| 1. | Appendages of ninth abdominal segment two-jointed, not spiniform; only one ocellus on each side | *Gernet's undetermined larva.* |
| | Appendages of ninth abdominal segment spiniform, joints three in number when not all fused together; several ocelli on each side | 2. |
| 2. | Apex of mandibles bidentate; all three joints of maxillary palps equally distinct | 3. |
| | Apex of mandibles tridentate; basal joint of maxillary palps very short and obscure (ocelli 3 + 2 on each side) | *U. crenatus.* |
| 3. | Ocelli 4 + 2 on each side; appendages of ninth abdominal segment distinctly jointed | *U. planatus.* |
| | Ocelli 4 + 1 on each side; appendages of ninth abdominal segment rigid throughout | 4. |
| 4. | Appendages of eighth abdominal segment two-jointed (*i.e.* the terminal spine articulated, not fused, to the basal part); seventh abdominal segment wider than long | *U. indica.* |
| | Appendages of eighth abdominal segment rigid; seventh abdominal segment longer than wide | *U. serricollis.* |

## PUPA.

The pupa is white in life, and is very like that of *U. serricollis*. The antennae are much shorter than in the pupa of *U. serricollis*

(? in both sexes). They are ornamented with fleshy processes, of which the larger are placed in circlets round the ends of the developing segments of the antennae of the adult, and the smaller round the middle of each of these segments except the long basal one on which they are more numerous. The abdomen is armed on either side with a series of long, fleshy, more or less forwardly-directed processes, on to the end of each of which a large and more or less backwardly-directed spine is articulated.

A considerable number of Cucujid life-histories have already been worked out wholly or in part, and the following is a list of the descriptions known to me.

### Key for the determination of genera of Cucujid larvae.

P. de Peyerimhoff, *Ann. Soc. Ent. Fr.*, LXXI, 1902 (1902-3), pp. 717-8.

### Catogenus rufus, Fabr.

* G. Dimcock, *Psyche*, III, pp. 341-2.
* W. F. Fiske, *Proc. Ent. Soc. Washington*, VII, p. 90.

### Prostomis mandibularis, Fabr.

W. F. Erichson, *Arch. Naturg.*, 1847, pp. 285-6.
Chapuis and Candèze, "Catalogue des Larves des Coléoptères", *Mem. Soc. R. Sci. Liége*, VIII, 1853, p. 425.[1]
J. Curtis, *Trans. Ent. Soc. London* (n.s.) III, 1854-6, pp. 37-39, pl. v, figs. 23-24.
E. Perris, "Larves de Coléoptères", Paris, 1877, p. 56.

### Cucujus clavipes, Fabr.

* Wilson, *Bull. Brooklyn Soc.*, I, p. 56.

### Cucujus coccinatus, Lewis.

A. S. Olliff, *Cist. Ent.*, III, 1882-5, pp. 59-60, pl. iii, fig. 7.

### Cucujus haematodes, Erichs.

* W. F. Erichson, *Naturg. Ins. Deutschl.*, III, 1845, p. 310.
H. Assmann, *Stett. Ent. Zeit.*, XII, 1851, p. 352, pl. ii, figs. C-D.
Chapuis and Candèze, *Mem. Soc. R. Sci. Liége*, VIII, p. 426, pl. ii, fig. 8 (figure reproduced in Lefroy's "Indian Insect Life," p. 301).

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* Papers marked thus are not available in Calcutta.
[1] Apparently = p. 85 of reprint (see Perris, "Larves de Coléoptères", p. 56).

**Platisus integricollis,** Reitter.

A. M. Lea, *Proc. Linn. Soc. N.S. Wales,* XXIX, 1904, pp. 88-9, pl. iv, fig. 6.

**Inopeplus praeustus,** Chevol.

P. de Peyerimhoff, *Ann. Soc. Ent. Fr.,* LXXI, 1902-3, pp. 715-8, 3 text-figs.

**Uleiota**[1] **crenata,** Payk.

F. B. White, *Ent. Mo. Mag.,* VIII, 1871-2, pp. 196-8.
E. Perris, "Larves de Coléoptères", pp. 60-62.

**Uleiota**[1] **planata,** Linn.

* W F. Erichson, *Naturg. Ins. Deutschl.,* 1846, p. 332.
Chapuis and Candèze, *Mem. Soc. R. Sci. Liége,* VIII, 1853, pp. 428-9.
E. Perris, *Ann. Soc. Ent. Fr.* (3) I, 1853, pp. 621-626, pl. xix, figs. 127-137 (2 figs. reproduced by Sharp, Camb. Nat. Hist., Insects, pt. ii, p. 234, fig. 115), and "Larves de Coléoptères", pp. 57-59.

**Uleiota**[1] **serricollis,** Candèze.

M. E. Candèze, *Mem. Soc. R. Sci. Liége,* XVI, 1861, pp. 341-343, pl. ii, figs. 1-1*e*.

**? Uleiota**[1] **sp.**[2]

C. v. Gernet, *Horae Soc. Ent. Ross.* VI, 1869, pp. 3-6, pl. i, figs. 7-7*g*.

**Laemophloeus ater,** Oliv.

J O. Westwood ("*Cucujus spartii*": see Perris, "Larves de Coléoptères", p. 60, concerning this synonymy), "Introduction to the Classification of Insects" I, pp. 149-150, fig. 12 (19).
E. Perris, "Larves de Coléoptères", p. 62.

**Laemophloeus bimaculatus,** Payk.

E. Perris, "Larves de Coléoptères", p. 62.

**Laemophloeus clematidis,** Erichson.

E. Perris, "Larves de Coléoptères", p. 62.

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* References marked thus are not available in Calcutta.

[1] Or *Hyliota* = *Brontes,* incl. *Dendrophagus*; see Arrow, *Trans. Ent. Soc.* 1901, p. 593.

[2] Not *U. crenata*; see White, *Ent. Mo. Mag.,* VIII, 1871-2, p. 198. The larva was not reared, and White thought it could not belong to the genus *Uleiota* at all. But it has all the distinctive characters of the larvae of this genus given in Peyerimhoff's key.

**Laemophloeus dufouri,** Laboulbène.

E. Perris, *Ann. Soc. Ent. Fr.* (3) I, 1853, pp. 618-621, pl. xix, figs. 122-6.

**Laemophloeus ferugineus,** Stephens.

Carpentier, *Bull. Soc. Linn. nord France,* 1877, pp. 239-241.
H. S. Olliff, *Entomologist,* XV, 1882, pp 214-5.

**Laemophloeus hypobori,** Perris.

E. Perris, "Larves de Coléoptères", p. 62.

**Laemophloeus juniperi,** Grouvelle.

F. Decaux, *Bull. Soc. Ent. Fr.,* 1890, pp. cxxv-cxxvi.

**Laemophloeus monilis,** Fabr.[1]

* Bellevoye. *Bull. Soc. Metz* (2) XIV, 1876, pp. 183-9.

**Laemophloeus testaceus,** Fabr.

E. Perris, "Larves de Coléoptères", pp. 59-60, pl. ii, figs. 43-45.

**Lathropus sepicola,** Müller.

* E. Perris in Gobert's Cat. Col. Landes, fasc. 3, p. 122, and "Larves de Coléoptères", pp. 62-65, pl. ii, figs. 46-53.

**Pediacus dermestoides,** Fabr.

E. Perris, *Ann. Soc. Ent. Fr.* (4) II, 1862, pp. 190-2, pl. v, figs. 535-543.

**Prostominia convexiuscula,** Grouvelle.

P. de Peyerimhoff, *Tran. Linn. Soc. London* (2 Zool.) XVII, 1914, pp. 156-159, figs. A.-F.

**Silvanus advena,** Waltl.

E. Perris, "Larves de Coléoptères", pp. 65-68.

**Silvanus surinamensis,** Linnaeus.[2]

J O. Westwood, "Introduction to the Classification of Insects" I, p. 154, fig. 13 (10-12).

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* References marked thus are not available in Calcutta.

[1] = *denticulatus,* Preyssl. (Munich Catalogue).

[2] The larvae figured by different authors are not all alike, and it scarcely seems possible that all of them can belong to one species.

J. F. J Blisson (*S. sexdentatus*), *Ann. Soc. Ent. Fr.* (2) VII, 1849, pp. 163-172, pl. vi, fig 1.

C. Coquerel (*S. sexdentatus*), *Ann. Soc. Ent. Fr.* VII, 1849, p. 172.

F. H. Chittenden, *U. S. Agric. Ent. Bull.* (n.s.) 4, 1896, pp. 121-2, figs. 59*a-d* (figure of larva reproduced with new figure of adult in Fletcher's "South Indian Insects", p. 290).

* Jablonouski, *Termes. Kosl.*, 1899, pp. 126-130, text-figs.

* J Curtis, "Farm Insects", Lond., 1883 (figure reproduced in *Ind. Mus. Notes* III [3] p. 120).

Lefroy, "Indian Insect Life", pp. 300-301, text-figs. 179-180.

**Silvanus unidentatus,** Fabr.

E. Perris, *Ann. Soc. Ent. Fr.* (3) I, 1853, pp. 627-633, pl. xix, figs. 138-143.

E. Perris, "Larves de Coléoptères", p. 65.

**? Nausibius dentatus,** Marsh.

J. O. Westwood, "Introduction to the Classification of Insects" I, pp. 153-4.

## II. Lycidae—*Lyropaeus biguttatus,* Westwood,[1] and some "Trilobite Larvae."

(Plate xx, figs. 1-12).

Larvae, pupae and an adult of this species were found clustered together on the under side of a large slab of stone, which was resting on other stones in such a manner as to leave a clear space above the ground beneath it. The pupae hung head downwards from the mid-dorsal fissure of the cast larval skins, which remained unshrivelled on the stone in the positions taken up by the larvae prior to pupation.

Adults were obtained in Cochin at altitudes varying from the level of the base of the hills to two or three thousand feet above the sea, and there is one specimen in our collection from the Nilgiris. The distribution of black pigment is very variable, and the black spots on the elytra are often absent. A specimen from Nedumangad in Travancore, determined by Bourgeois himself as *L. aurantiacus*, Bourgeois,[2] evidently belongs to the same species; and *L. aurantiacus* may therefore be regarded as a synonym of *L. biguttatus.*

### Larva.

The larva is flattened as a whole, and is of a blackish brown colour.

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* References marked thus are not available in Calcutta.

[1] *Ann. Mag. Nat. Hist.* (5) V, 1880, p. 213.

[2] *Ann. Soc. Ent. Fr.* LXXVII, 1908-9, pp. 503-4.

The head can be retracted into a tubular pouch opening below the anterior margin of the prothorax, and the short thick antennae can be retracted into the head. The almost globular termination of each antenna is ornamented with more or less labyrinthine markings. The mandibles are small and are inserted in the middle line as in other Lycid larvae. They are very slender and project almost vertically downwards as a whole, but are directed slightly backwards basally and forwards distally, being lightly curved throughout. Their extremities rest in grooves on the upper surfaces of the somewhat fleshy blades of the maxillae, and as the mandibles are rather long they press the maxillae downwards till they too project almost vertically. The maxillary palps are three-jointed (excluding the basal support), and the labial palps two-jointed; both have the form of a slender cone.

The pronotum is roughly triangular, nearly as long as wide, truncate in front, and slightly rounded at the two posterior angles. The mesonotum and metanotum are roughly rectangular, slightly more than twice as wide as long, with the anterior angles somewhat obtuse and the posterior somewhat acute, especially those of the metanotum. Equally well developed spiracles are present on the mesothorax and metathorax.

The first eight abdominal tergites are much alike. The anterior ones are somewhat, and the posterior ones much, narrower than the thoracic segments, and all are very much shorter. Each is produced laterally into a simple stout backwardly-curved process. The terminal abdominal segment is somewhat longer than the segments immediately in front of it, being little more than twice as wide as long.

The abdominal sterna bear a pair of small conical processes on their posterior margins. These processes are more distinct on the posterior than on the anterior segments, and bear a tuft of bristles on the last two. The sternum of the terminal segment is without these processes, and bears the sucker-like anus.

## PUPA.

The pupa is white in life, but the preserved specimens have become brownish.

The pronotum is quadrangular with almost straight sides; it is broader behind than in front, and even in front is broader than long. It does not overlap the head, which is bent downwards.

Each of the first three abdominal segments bears on either side above the stigma an elongate simple process with conical base, and below it a similar but moniliform (? jointed) process. The five following segments bear only a pair of conical processes above the stigmata, those of the first of these segments being the smallest. The terminal segment bears a pair of much slenderer processes.

The appendages are smooth, and not distinctly segmented.

## "TRILOBITE LARVAE."

The *Lyropaeus* larva described above belongs to the group known as "Trilobite Larvae." The "Trilobite Larvae," which have hitherto attracted most attention, have been of extraordinarily large size, and the group has been a puzzle to entomologists ever since Perty described his *Larva singularis* in 1831. The following references to "Trilobite Larvae" are known to me:—


*1831. Perty, M. "Observationes Nonnullae in Coleoptera Indiae Orientalis", p. 33, pl. i, figs. 8-9.

1839. Westwood, J. O. "Introduction to the Classification of Insects" I, p. 254, figs. 27 (1) and 28 (1).

1841. Erichson, W. F. "Zur systematischen Kenntniss der Insectenlarven." *Arch. Naturg.*, VII, pp. 91-92.

1861. Candèze, M. E. "Histoire des Metamorphoses de quelques Coléoptères exotique." *Mem. Soc. R. Sci. Liége,* XVI, 1861, pp. 358 (apparently p. 34 in reprint) and 403-4, pl. vi, fig. 12.

1887. Kolbe, H. J. "Ueber einige exotische Lepidopteren- und Coleopteren-Larven, (6) Perty's '*Larva singularis*'" *Ent. Nachr.*, III, pp. 37-39.

1887. Lucas, M. H. *Bull. Soc. Ent Fr.*, 1887, pp. xxxv-xxxvii, reprinted in "Mission Pavie Indo-Chine 1879-1895", 1904, pp. 104-5.

1898. Gahan, C. J "Dipeltis a Fossil Insect?" *Nat. Sci.* XII, pp. 42-44, 2 text-figs.

*1899. Bolivar, I. "Anomalous Larvae from the Philippines." *Act. Soc. Espan.* 1899, pp. 130-133, text-figs.

1899. Bourgeois, J "Description de deux larves remarkables appartenant probablement au genre *Lycus*." *Bull. Soc. Ent. Fr.*, 1899, pp. 58-63, 2 text-figs.

1899. Sharp, D. "On the Insects from New Brittain," Willey's Zool. Results, p. 383, pl. xxxv, figs. 4-4*b*.

1899. Sharp, D. Cambridge Natural History, Insects, pt. II, p. 251.

1900. Hanitsch, R. "An Expedition to Mount Kina Balu, British North Borneo." *J Straits R. Asiatic Soc.* No. 34, pp. 77-79.

1901. Shelford, R. "Notes on Some Bornean Insects." *Rep. Brit. Ass.*, 1901, pp. 690-691.

1908. Gahan, C. J. "Lampyridae from Ceylon." *Proc. Ent. Soc. London*, 1908, p. xlviii.

1913. Gahan, C. J "On some Singular Larval Forms of Beetle to be found in Borneo." *J Sarawak Mus.* I, pp. 61-65, 3 text-figs.


Perty thought his *Larva singularis* was to be ascribed to a Necrophagous rather than to a Malacodermatous insect; but Westwood disagreed with him, and suggested that it belonged

* Papers marked thus are not available in Calcutta.

rather to some species of *Lycus*. To this genus—which has since been subjected to extensive subdivision—he was also inclined to refer the slender parallel-sided insect of the "Trilobite" group, which he was the first to notice and figure.

Erichson accepts these insects as Malacoderms, but in spite of their weak mandibles regards them, because of their shape and because the head is completely retractile, as Lampyrids rather than Lycids. Candèze agrees with Erichson; but Kolbe returns to Westwood's view, and even goes so far as to suggest that the specimens which were sent to him were probably the larvae of *Lycus* (*Lycostomus*) *melanurus*, Blanchard.[1] The opinions of other authors are similarly divided.

Gahan (1913) favours Lycidae, but does not think the insects can belong to the genus *Lycus*, as they are very unlike the authenticated larvae of that genus. He thinks it more probable that they belong to some genus in which only the male—perhaps not even the male[2]—is winged. Further, he points out that the known distribution of "Trilobite Larvae" corresponds to that of the genus *Lyropaeus*, of which only males are known to him; and he suggests an association with this genus. His conclusion is in a measure confirmed by the above observations on the development of *Lyropaeus biguttatus*, and it is noteworthy that all the winged specimens that I have seen are males.

The larvae which give rise to these winged insects are, however, not particularly large, and throw no certain light on the status of the much larger insects with which the name "Trilobite Larvae" is more particularly associated. Two large insects of the "Trilobite" type were also, however, found in the Cochin forests. These are figured on pl. xx, figs. 9-12.

One of them (pl. xx, figs. 9-10) is very like the larvae found to develop into males of *Lyropaeus biguttatus*. The principal differences are the presence of more definite tubercles at the angles of the thoracic terga in the former than in the latter; the paler colour of the upper surface; and the yellow colour of the legs and sterna and of the lower surface of the lateral extensions of the terga, which contrast strongly with the black pleural structures. These, however, are features which may well be acquired only as maturity is approached. The specimen is not nearly so large as many species are known to become, and dissection has shown it to be immature; but it may perhaps represent a stage in the development of the female of *Lyropaeus biguttatus*, a female which in that case will almost certainly prove to be larviform.

The other specimen of "Trilobite Larva" found in Cochin (pl. xx, figs. 11-12) is slightly smaller, is black in colour, and is ornamented with more numerous and more elaborate tubercles and

[1] Authenticated larvae of this species have since been briefly described by Shelford (*Rep. Brit. Ass.*, 1901, p. 690). They do not appear to be of the "Trilobite" type, and are only 25 mm. long when full grown.

[2] See also Shelford's comment on a previous note by Gahan (*loc. cit.* 1908)

papillae, and appears to have shorter mandibles as these do not press the maxillae downwards and so are completely hidden. It differs greatly in this way from the larvae of *Lyropaeus biguttatus*, and need not be further discussed here.

Another South Indian species is represented in our collection by a dried specimen whose head, prothorax and legs are missing. It is transitional in character between the two preceding, resembling the former in colour, but having a double row of rudimentary tubercles down the back, and rudimentary tubercles on the abdominal epimera and episterna. It may represent a further stage in the development of that species; or it may be more nearly allied to a series of smaller larvae from Naduvotam (Nilgiris, 7000 ft.) which are preserved in the collection of the Agricultural Research Institute, Pusa, whence two specimens have been presented to our collection. It closely resembles these larvae in structure, but in them the yellow on the lower surface is confined to the anterior part and lateral angles of the prothorax, the anterior parts of the mesosterum and metasternum near the middle line, the abdominal sterna, and the bases of the legs.

The occurrence in the Pusa collection of a male insect from Naduvotam, belonging to the *Lyropaeus*-like genus *Calochromus*, suggested the possibility that this might be an adult of the species to which the "Trilobite Larvae" from that locality belonged. *Calochromus* is placed by Bourgeois (*Ann. Soc. Ent. Fr.* XI, 1891, p. 348) in the *Lygistopterus* group of genera, which immediately precedes in his system the *Dilophotes* group containing *Lyropaeus*[1]; and the larva of *C. melanurus* which has been briefly described by Shelford (*Rep. Brit. Ass.*, 1901, p. 690) appears to be of the "Trilobite" type. Males of *Calochromus* are much more numerous than females among the few specimens I have examined; but this may be due to their being more active, and females undoubtedly occur in some species. It is, however, possible, that some species of the genus may have large larviform females, or even that winged and larviform females may occur together in some or all species.

Our collection contains, in addition to the above South Indian specimens of the *Lyropaeus* or broad type of "Trilobite Larva", specimens of this type from the following localities:—

Ceylon: Peradeniya (? two species[2]).
Bengal: Chittagong—Rangamatti.
Burma: Sadon (Myitkyina Dist.); Pegu.
Malay Peninsula: Lankawi; Singapore.
Philippines.

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[1] The genera *Calochromus* and *Lyropaeus* are, however, placed almost at opposite ends of the family by Westwood (*Trans. Ent. Soc. London*, 1878, pp. 96 and 104-5, and "Illustrations of Typical Specimens of Coleoptera in the collection of the British Museum, Pt. I, Lycidae", London, 1879, pp. 2-8 and 78).

[2] In one of these, represented by a single small specimen, the metathoracic stigmata are absent, and the prolongations of the angles of the abdominal terga and of other plates are very feebly developed.

Specimens of the slender type are represented from the following localities:—

Malay Peninsula: Johore.
Sinkep Island (near Sumatra).

I have examined the mouthparts of one specimen of the latter type from Johore, and of one of the specimens of the former type from Lankawi and of those from Ceylon. They are all constructed on the same plan, but are apt to be less slender than in the larva of *Lyropaeus biguttatus*.[1]

It is difficult to see how these creatures can feed. The mandibles are presumably used to pump juices along the grooved maxillae in much the same way as the maxillae are used to pump juices along the grooved mandibles of Hemerobiid larvae. But "Trilobite Larvae" seem to have no means of grasping prey. Presumably therefore they must eat something which they need not grasp securely, such as snails or planarians. Dr. Annandale tells me that he found these "larvae" in great abundance in the Malay Peninsula. He noticed that the broad and slender types always occurred together, which led him to think that the difference might conceivably be sexual[2]; and that they were only found where planarians were plentiful and snails scarce. It seems not unlikely, therefore, that they feed on planarians. It is also possible that they may feed on the juices of decaying wood, etc., which might account for the long periods of time during which they have been known to live without being known to feed (Gahan, 1913, p. 62).

Trilobite larvae are known in some instances at least to be luminous. This was first recorded by Kolbe (*loc. cit.*) on very uncertain authority, but Shelford (*loc. cit.*) has since noticed that one species has a pair of phosphoresecent organs on the penultimate segment of the abdomen.

## III. Tenebrionidae—*Catapiestus indicus*, Fairmaire.

(Plate xxi, figs. 20-25).

Fairmaire described this species (*Ann. Soc. Ent. Belge.* XL, 1896, p. 28) from specimens collected in Kanara, and noted that it occurred in "Sikkim" also. It appears to have a wide distribution extending from the Western Ghats of Southern India to the Abor country and Lower Burma (for details see Tenebrionidae of the Abor Expedition, *Rec. Ind. Mus.* VIII).

The specimens described below were taken with adults from under the bark of a fallen log. A cast larval skin was found close behind the pupa.

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[1] Other authors refer to the maxillary and labial palps as four and three-jointed respectively, instead of as three and two-jointed as they appear to me to be both in cleared cast-skins and potashed specimens.

[2] The slender type does not seem to occur in the Indian Peninsula or Ceylon; but this may mean that it is only in the Malay Region, where "Trilobite Larvae" appear to reach their highest development, that larviform males occur.

LARVA.

The larva of *Catapiestus indicus* is a parallel-sided, elongate, flattened insect, brownish in colour, and terminated behind by a pair of long spiniform processes (see pl. xxi, figs. 20-21).

The head is almost semicircular, with a well-defined and somewhat prominent clypeus which bends downwards, so that the semicircular labrum is almost vertical and only partly visible from above. The suture limiting the frons behind is (? always) very distinct; it extends on either side from a point in the middle line immediately in front of the anterior margin of the pronotum, almost in a straight line towards a point on the margin of the head immediately behind the base of the antenna; but after traversing nearly half this distance, it turns abruptly forwards to run a short distance parallel to the sagittal plane and then bends straight outwards till it regains its former line, which it resumes and follows to the margin of the head.

The ocelli are four in number on each side, three in a line situated immediately behind the base of the antenna, and one a little behind them on the dorsal surface.

The antennae are four-jointed. The basal joint is scarcely as long as broad; the second joint is somewhat longer than broad; the third joint is fully twice as long as the second and scarcely as thick; the fourth joint is minute, being only about as long as the third joint is broad, and about one-third as broad as long.

The mandibles are stout and are tridentate distally, the middle tooth being the largest and most prominent, the lowest the smallest and more or less fused with it. There is a very large molar tooth.

The lobe of the maxilla is about twice as long as broad, simply rounded distally. The maxillary palps have three joints, of which the middle one is a little the longest and the third is slenderer than the other two, which latter are of uniform width throughout and are together about as long as the lobe. The labial palps have two joints of about equal length; the basal is stouter than the distal.

The terga are traversed, except in the terminal segment, by a median longitudinal groove or suture which does not, however, extend across the slightly darkened transverse band by which each is bordered behind. Each segment except the last bears laterally a few long erect hairs.

The last segment bears on each side two stout backwardly-curved spines, of which the posterior is followed dorsally by three similar spines. The last four form a straight line lying obliquely across the base of the long terminal spine. The terminal spine bears two long erect hairs rather more than half way along the ventral surface. One such hair is associated with each of the smaller spines, except the middle one of the three above the base of each terminal spine; and six are arranged in a semicircle

on the ventral surface of the body of the segment, between the anal papilla and the margin. The anal papilla is semicircular, and bears one pair of blunt conical spinules in the angles, and four smaller spinules arranged in a square medially. Of these four the two anterior are distinctly smaller than the two posterior.

## PUPA.

The pupa is white in colour. Its form is shown on pl. xxi, figs. 22-23. Each of the marginal denticulations of the prothorax is continued into a papilla which is empty and transparent in the preserved specimen and so does not show in the photograph, and these papillae are tipped with long erect hairs. Similar hairs are present one on either side of the labrum, three on either side of the clypeus, two immediately in front of each eye, two between and behind the eyes, one in the middle of the anterior margin of the pronotum, two on either side mounted on papillae a little behind the anterior margin of the pronotum, one on either side a little in front of the posterior margin of the pronotum, two on either side of the meso- and metanotum,[1] one on either side of the third and two on either side of the fourth to eighth abdominal sterna.

The first six abdominal sterna are quadrangular, the seventh and eighth more nearly triangular. There is a pair of short divergent styles in the position of the anal papilla of the larva. The terminal segment is very like that of the larva; the anterior pair of marginal spines and the semicircle of hairs behind the anal papilla have, however, disappeared ; and the two hairs on each of the terminal spines are now mounted on strong spinules.

The most important works on Tenebrionid larvae appear to be [2] :—

1839. Westwood, J O. "Introduction to the Classification of Insects" I (London, 1839), pp. 316-324, text-figs.

1853. Chapuis and Candèze. "Catalogue des Larves des Coléoptères." *Mem. Soc. R. Sci. Liége,* VIII, pp. 513-517, pl. vi, figs. 5-6*a*.

1877. Perris, E. "Larves de Coléoptères" (Paris, 1877), pp. 252-294, pl. viii, fig. 277, pl. ix, fig. 310.

1877. Schiodte, J C. "De Metamorphosi Eleutheratorum Observationes" *Naturhist. Tidsskr.* XI, pp. 479-598, pls. v-xii.

All known larvae of the subfamily Tenebrioninae, in which Gebien places the genus *Catapiestus* (Junk's "Coleopterorum Catalogus", Tenebrionidaem-Trictenotomidae), appear to be described or referred to in these works, except that of *Menephilus*

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1 Three on the left side of the mesonotum in our only specimen.

2 A useful list of Tenebrionid larvae, with a key to generic characters, is given by Kiesenwetter and Seidlitz, *Naturg. Ins. Deutschl.*—Coleoptera V (1) Tenebrionidae (Berlin, 1898), pp. 207-217.

*cylindricus* (=*curvipes*).[1] This larva, and two others belonging to the same subfamily, seem to resemble the larva of *Catapiestus indicus* more closely than do any other Tenebrionid larvae of which I have seen descriptions. The other two are *Iphthimus italicus*[2], and the South American species of *Upis* referred to on p. 319 of the first volume of Westwood's "Introduction to the Classification of Insects."[3] The larva of the last named insect is, however, known only from fragments of its cast-skin, and many of its characters are consequently somewhat uncertain.

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[1] Described by Perris, *Ann. Soc. Ent. France*, (3) V, 1857, pp. 361-7, pl. viii, figs. 444-457.

[2] Described by Mulsant and Revelière, *Opusc. Ent.* XI, 1859, pp. 63-66.

[3] Described by Westwood, *Trans. Ent. Soc. London*, II, 1837-40, pp. 157-162, pl. xiv, figs. 11-18.

## EXPLANATION OF PLATE XX.

FIG. 1.—*Lyropaeus biguttatus*, Westwood. Larva from below. × 2.

,, 2.— ,, ,, ,, ,, ,, above. × 2.

,, 3.— ,, ,, ,, Part of ventral surface of abdomen more highly magnified.

,, 4.—*Lyropaeus biguttatus*, Westwood. Head of larva in prothoracic sheath, from in front.

,, 5.—*Lyropaeus biguttatus*, Westwood. Pupa with larval skin attached, from the side. × 2.

,, 6.—*Lyropaeus biguttatus*, Westwood. Pupa with larval skin removed, from above. × 2.

,, 7.—*Lyropaeus biguttatus*, Westwood. Male from below. × 2.

, 8.— ,, ,, ,, ,, ,, above. × 2.

,, 9.—? Immature female of *Lyropaeus biguttatus*, Westwood, from below. × 2.

,, 10.—? Immature female of *Lyropaeus biguttatus*, Westwood, from above. × 2.

,, 11.—Another form of "Trilobite Larva" from Cochin, from above. × 2.

,, 12.—Part of ventral side of abdomen of same specimen more highly magnified.

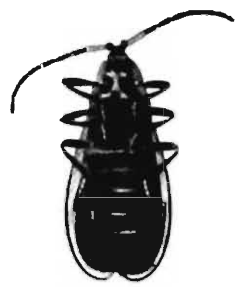
1.

2.

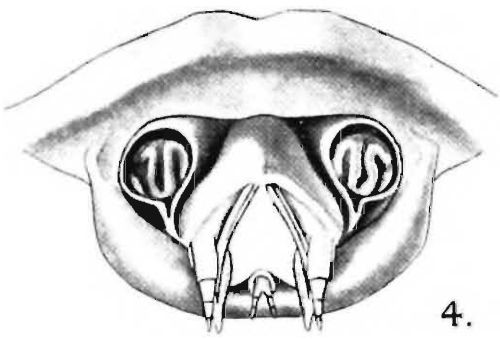
5.

6.

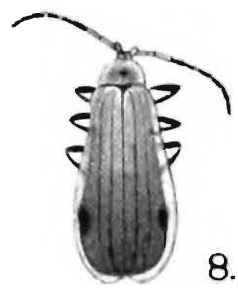
3.



7.



4.



8.

9.

10.

11.

12.

BEETLES FROM COCHIN.

## EXPLANATION OF PLATE XXI.

FIG. 13.—*Uleiota indica*, Arrow. Larva from above. × 4½.

,, 14.— ,, ,, ,, Posterior end of larva more highly magnified.

,, 15.—*Uleiota indica*, Arrow. Left spine of ninth abdominal segment of larva. × 30.

,, 16.—*Uleiota indica*, Arrow. Left spine of eighth abdominal segment of larva. × 40.

,, 17.—*Uleiota indica*, Arrow. Pupa from above. × 4½.

,, 18.— ,, ,, ,, ,, ,, below. × 4½.

,, 19.— ,, ,, ,, Adult from above. × 4½.

,, 20.—*Catapiestus indicus*, Fairm. Larva from above. × 2.

,, 21.— ,, ,, ,, ,, ,, below. × 2.

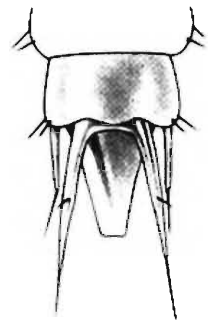
,, 22.— ,, ,, ,, Pupa from above. × 2.

,, 23.— ,, ,, ,, ,, ,, below. × 2.

,, 24.— ,, ,, ,, Adult from above. × 2.

,, 25.— ,, ,, ,, ,, ,, below. × 2.

13.



14.

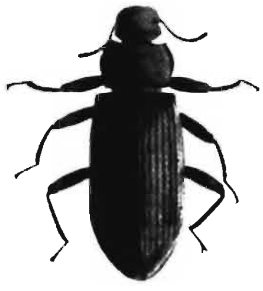
15.

16.

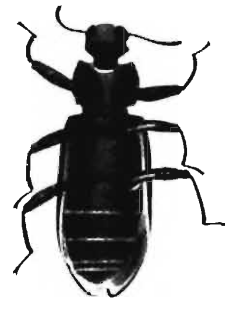
17.

18.

19.



24.



25.

20.

22.

23.

21.

BEETLES FROM COCHIN.

# XXI CRYPTOSTOMES OF THE INDIAN MUSEUM

## PART II.

*By* S. MAULIK, *B.A. (Cantab), F.E.S., Imperial College of Science and Technology, University of London.*

This paper is my second report on the Cryptostomes contained in the collections of the Indian Museum, my first having appeared in this journal (Vol. IX, part II, No. 7, 1913). In preparing it, I have followed the same method as before. The usual notes regarding distribution and variation have been added. Twenty-two species of the Hispinae are enumerated here, six of which are new to science, as is shown in the following list:—

1. *Botryonopa sheppardi*, Baly (var.)
2. *Macrispa krishnalohita*, n. sp.
3. *Anisodera guerini*, Baly.
4. ,, *excavata*, Baly.
5. *Prionispa himalayensis*, n. sp.
6. *Oncocephala quadrilobata*, Guér. (var.)
7. *Javeta pallida*, Baly.
8. *Agonia saundersi*, Baly.
9. *Gonophora bengalensis*, Ws.
10. ,, *haemorrhoidalis*, Weber.
11. *Monochirus sthulacundus*, n. sp.
12. *Hispella stygia*, Chap.
13. ,, *ramosa*, Gyll.
14. ,, *andrewesi*, Ws. (?)
15. *Rhadinosa girija*, n. sp.
16. ,, *laghu*, n. sp.
17. *Asamangulia cuspidata*, n. g., n. sp.
18. *Dactylispa spinosa*, Weber.
19. *Hispa armigera*, Oliv.
20. *Platypria echidna*, Guér.
21. ,, *hystrix*, F.
22. ,, *erinaceus*, F.

I have to thank the Indian Museum authorities for sending me their material here. To Mr. Andrewes my acknowledgments are due for his kindness in letting me see the types in his collection and also for letting me have three specimens of one new species described here. Dr. Gestro, of the Genoa Museum, has very kindly sent me some of his types, for which I wish to express my thanks. My obligations are also due to the British Museum authorities and Dr. Gahan for affording me all facilities in the Museum.

## Family CHRYSOMELIDAE.

### Group CRYPTOSTOMATA.

### Subfamily *HISPINAE.*

### Tribe *BOTRYONOPINI.*

### Genus **Botryonopa,** Blanch.

Blanchard, *Hist. Nat. Ins.* II, 1845, p. 181.
Baly, *Cat. Hisp.* 1858, p. 91, t. 2, f. 6.
Chapuis, *Gen. Col.* XI, 1875, p. 291.
*Hispopria*, Baly, *Cat. Hisp.* 1858, p. 94, t. 2, f. 7.
,, Chapuis, *Gen. Col.* XI, 1875, p. 297.

#### **Botryonopa sheppardi,** Baly (var.).

Baly, *Cat. Hisp.* 1858, p. 92, t. 7, f. 4.
Weise, *Stett. Ent. Zeit*, LXIX, 1908, p. 214.

*Locality.*—Silchar, Cachar (*J Wood-Mason*). One example.

It is a small specimen. The upper portion of the elytra and the prothorax are yellow and not of the usual red colour.

### Genus **Macrispa,** Baly.

This genus was erected by Baly in 1858 (*Cat. Hisp.* 1858, p. 90) for the reception of *Macrispa saundersi*, Baly. The locality of this insect was not known at that time. Twenty-one years later, in working out the Phytophagous Coleoptera collected by Chennell in Assam, Baly found a very imperfect specimen of *Macrispa.* This localised the habitat of the genus (*Cist. Ent.* II, 1879, p. 405). The imperfect specimen has been indentified as *M. saundersi*, which, as I shall show, is not correct. In 1906 Gestro in a little note (*Ann. Mus. Civ. Gen.* 1906, p. 130) said that in the Oberthür collection he had found one example reported from British Bhutan. Thus there exist in the collections only three examples of the genus. I have before me three more examples (1 ♂ 2 ♀ ♀) which clearly belong to *Macrispa.* But it will be necessary to describe them as a new species.

In enumerating the generic characters, Baly states in reference to the antennae:—"Corporis dimidio longitudine, super tubercula duo inter oculos insertae, subfiliformes, ad apicem subincrassatae, articulo primo incrassato, secundo brevi, duobus proximis elongatis, gracilioribus, caeteris fere aequalibus, obconicis, perparum leniter incrassatis, subcompressis."

The following points in this description call for notice:—

(1) As the length of the antenna differs in the sexes (Baly had one ♀ specimen before him when he drew up the description) its relation to the length of the body cannot be made a generic character.

(2) In the specimens before me the third and fourth joints of the antenna are not slenderer than the rest.

(3) The antenna does not gradually increase in thickness towards the apex.

As these characters are not present in the specimens before me, they cannot be made generic characters.

One of the secondary sexual characters of this genus is a semilunate depression on the last abdominal sternite of the female. The depression varies in different species. Judging from this character, *M. saundersi*, Baly (one example in British Museum) is a female, and the imperfect specimen (British Museum) is also a female, but the depression being different, its identity as *M saundersi* (*Cist. Ent.* II, 1879, p. 405) is doubtful. Besides, the elytra of the imperfect *Macrispa* is rufous and subnitid, whereas *M. saundersi* has opaque fulvous elytra.

## Macrispa krishnalohita,[1] n. sp.

*Macrispa krishnalohita*, n. sp. is distinguished from *M saundersi*, Baly, by the following characters:—

| | *M. krishnalohita.* | *M. saundersi.* |
|---|---|---|
| 1. | Smaller insect, 22 mm. | Larger insect, 25·5 mm. |
| 2. | Apices of the joints of antennae not knobby. | Apices of the joints of antennae knobby. |
| 3. | Thorax suddenly constricted in front. | Thorax less constricted in front. |
| 4. | Colour of elytra subnitid, rufous. | Elytra opaque, fulvous. |
| 5. | Semilunate depression on the last abdominal sternite (♀) broader. | The depression narrower. |

Elongate; head, antennae, prothorax, abdomen, legs, shining black; elytra rufous, subnitid; the disc of the prothorax with a large finely punctate area in the middle, base transversely strigose.

Length: 22 mm.

*Locality.*—Dejoo, North Lakhimpur, base of hills, Upper Assam (*H. Stevens*, iv—viii-1911).

Described from three examples 2 ♀ ♀, 1 ♂

*Type* in Mr. Andrewes' collection, London.

*Co-type* in the Indian Museum, Calcutta.

### *Fuller description.*

*Head.*—Surface rugose, coarsely and deeply punctate, a deep groove from the vertex running along the middle line; 7 proximal joints of the antennae with coarse and elongated punctures and shining, 4 distal joints covered with a bloom, apical joint pointed, apices of all joints (except the last) impunctate and shining. Mouth parts covered with fulvous hairs.

*Prothorax* quadrate, abruptly narrowed in front, anterior angles obtuse and rounded, sides parallel, their margins slightly

[1] The specific name is derived from two Sanskrit words: *krishna* = black, *lohita* = red, thus indicating the two colours of the insect.

sinuate, subreflexed, posterior angles are sharp right angles; above shining black, anterior half of disc smooth, finely and sparsely punctate, this smooth shining surface narrows along the middle line and extends a little beyond the middle, one or two deep punctures on this smooth surface; on each side of the middle line a deep depression with punctures in it,—this character is not marked in *M. saundersi*, *Baly*; posterior half of disc coarsely and deeply punctate; at the base in front is a depression, base itself transversely strigose, the sides of the base sharply cut off, a character not present in *M saundersi*, Baly.

*Scutellum* longer than broad at base, at a quarter of its length from the base it is bent, depressed in the middle, one or two transverse ridges on the surface near the apex, apex rounded.

*Elytra* broader than the prothorax, elongate, subparellel in front, slightly dilated behind, extending considerably beyond the sides and apex of abdomen, their apex rounded, sutural angles armed with an acute tooth; surface subnitid; nine costae on each elytron, 1st an abbreviated one anastomosing with the sutural ridge, 2nd-5th run parallel to each other down the whole length of the elytron, 6th a short one terminates by breaking up into deep punctures, 7th runs down the whole length of the elytron, meeting the 5th at the apex, 8th short and similar to 6th, 9th runs down the whole length of the elytron; deep punctures between the costae, between the 5th and the 7th and between the 7th and the 9th confusedly and deeply punctate; these costae are thicker at their bases than at the apices, where there is a tendency to their being obliterated by the deep punctures. Margins of the elytra subreflexed.

*Underside* shining, black; femora armed with a short flattened tooth, finely punctate.

♀ Antennae shorter, femora of fore legs not incrassate, last abdominal sternite with a semilunate depression.

♂ Antennae longer, femora of fore legs incrassate, last abdominal sternite without a semilunate depression.

## Tribe *ANISODERINI.*

### Genus **Anisodera,** Baly.

Baly, *Cat. Hisp.* 1858, p. 101, t. 2, f. 8.
Chapuis, *Gen. Col.* XI, 1875, p. 295.
Weise, *Deutsche Ent. Zeitschr.* 1897, p. 118.

### **Anisodera guerini,** Baly.

Baly, *Cat. Hisp.* 1858, p. 101 (*ferruginea*), p. 168, t. 7, f. 8.
Gestro, *Ann. Mus. Civ. Gen.* 1885, p. 163.
,, *l.c.* 1890, p. 233, et 1897, p. 50.
*ferruginea*, Guer., *Rev. Zool.* 1840, p. 333.

*Locality.*—Sonapur, Assam (*L. W Middelton*). One example.

It has a wide distribution, having been reported from Java, Burma, Mungphu Sikkim, Tenasserim.

### **Anisodera excavata**, Baly.

Baly, *Cat. Hisp.* 1858, p. 105, t. 8, f. 1.

*Locality.*—Sadon, U. Burma, 5,000 ft., April 1911 (*E. Colenso*). One example.

It has been reported from the Himalayas, Tonkin, and Mung-phu. The excavation on the disc of the prothorax is variable; it is not always deep, and in some specimens it has almost disappeared. The blackness of the prothorax also is not constant, for in some cases the prothorax is of the same chestnut colour as the body. These notes are taken from the numerous examples in the collection of the British Museum.

## Tribe *CHOERIDIONINI.*

## Genus **Prionispa**, Chap.

Chapuis, *Gen. Col.* XI, 1875, p. 337.
Gestro, *Ann. Mus. Civ. Gen.* 1899, p. 226.

### **Prionispa himalayensis**, n. sp.

Cuneiform, rufo-testaceous, legs pale flavous, eyes, mandibles, labrum, and the apical four joints of the antennae black; external apical angles of the elytra are right angles, not produced into a spine; six large and small tubercles on each elytron. Length from head to apex of elytron 5 mm.

Described from one example.

*Locality.*—Kurseong, E. Himalayas, alt. 4,700-5,000 ft., 21-xi-10 (*Annandale*).

*Type* in the Indian Museum, Calcutta.

*Fuller description.*

*Head* rather projected, cylindrical, interantennal protuberance prominent, a few punctures on the vertex, underside smooth, shining; eyes oval, black; antennae, 1st joint small, 2nd joint longer than 1st, constricted at base, 3rd joint longest, 4th-7th gradually thickened towards the apex and each being shorter than the preceding. Joints 1-7 have got a peculiar transparency and a thin red ring at the apices; joints 8-11 opaque, black, 11th joint pointed.

*Prothorax* cylindrical, longer than broad, base bisinuate, sides with straight dark red margins, anterior angles toothed, disc coarsely and deeply punctate.

*Scutellum* longer than broad, narrowed at the apex, apex broadly rounded.

*Elytra* much broader at base than the prothorax, punctate-striate, shoulders elevated and projected; at about the middle of each elytron is a large shallow depression. There are two costae from the elevated humeral angle, one along the elevated surface up to the depression, the second below the elevated surface along

the side to the apex of the elytron. There are six tubercles on each elytron, disposed as follows:—

A little distance posterior to the base of the elytron is a small tubercle, at about the middle of the elytron between the suture and the elytral depression is the largest tubercle, which is concave on its outer side; posterior to this tubercle are two small tubercles, one very close to the suture and the other beyond the line on which the largest tubercle is situated; external to this tubercle a little thickening of the second costa looks like a minute tubercle, but is not really so. Finally, there are two minute tubercles on the sloping apical portion of the elytron, one on the line of the preceding sutural tubercle, the other on the line of the largest tubercle. The tubercles are darker in colour. Suture raised, widely divergent at base for the reception of the scutellum.

*Underside.*—Legs pale flavous, transparent; underside of thorax, coxae and claws dark red.

## Tribe *ONCOCEPHALINI.*

### Genus **Oncocephala**, Chevr.

Chevrolat in Dorbigny, *Dict. Univ. Hist. Nat.* IX, 1847, p. 110.
Chapuis, *Gen. Col.* XI, 1875, p. 308.
Weise, *Deut. Ent. Zeit.* 1897, p. 313.
Gestro, *Ann. Mus. Civ. Gen.* 1899, p. 313.
*Nepius*, Thomson, *Arch. Ent.* II, 1858, p. 225.

#### **Oncocephala quadrilobata**, Guér. (var.)

*Locality.*—Dawna Hills, 2000-3000 ft., L. Burma, 2—3-iii-08 (*Annandale*). Six examples.

This species has not been reported from this locality before.

## Tribe *COELAENOMENODERINI.*

### Genus **Javeta**, Baly.

Baly, *Cat. Hisp.* 1858, p. 108, t. 2, f. 10.

#### **Javeta pallida**, Baly.

There are four examples from Calcutta. Baly records it from Madras.

## Tribe *GONOPHORINI.*

### Genus **Agonia**, Ws.

Weise, *Deut. Ent. Zeit.* 1905, p. 116.
*Gonophora*, Baly, *Cat. Hisp.* 1858, p. 108 (pars.)
Chapuis, *Gen. Col.* XI, 1875, p. 303.
*Distolaca*, Baly, *l.c.*, p. 116 (pars.)
Chapuis, *l.c.*, p. 305.
Gestro, *Ann. Mus. Civ. Gen.* 1897, p. 67.

### **Agonia saundersi**, Baly.

Baly, *l.c.*, p. 110, t. 8, f. 4.

*Locality.*—Mungphu. One example.

### Genus **Gonophora**, Baly.

Baly, *Cat. Hisp.* 1858, p. 108, t. 2, f. 11.
Chapuis, *Gen. Col.* XI, 1875, p. 303.

### **Gonophora bengalensis**, Ws.

Weise, *Stett. Ent. Zeit.* LXIX, 1908, p. 214.

*Locality.*—Rungpur, Bengal. Two examples.

### **Gonophora haemorrhoidalis**, Weber.

Weber, *Obs. Ent.* 1801, p. 64.
Fabricius, *Syst. El.* II, 1801, p. 60.
Illiger, Mag. I, 1802, p. 183 (*Hispa*).
Baly, *Cat. Hisp.* 1858, p. 112.
Gestro, *Ann. Mus. Civ. Gen.* 1885, p. 167.
,, *l.c.*, 1897, p. 56, et 402.
,, *Notes Leyd. Mus.* XIX, 1897, p. 174.
,, *Bull. Soc. Ent. Ital.* 1902 (1903), p. 141.
Var. *niasensis*, Gest., *Ann. Mus. Civ. Gen.* 1897, p. 57.
Var. *undulata*, Ws., *Arch. f. Naturg.* 1905, p. 98.

*Locality.*—Johore, Malay Pen. (*Motiram*). One example.

### Tribe *HISPINI*.

### Genus **Monochirus**, Chap.

Chapuis, *Gen. Col.* XI, 1875, p. 330.
*Hispellinus*, Weise., *Deut. Ent. Zeit.* 1897, p. 144.
,, *l.c.*, 1905, p. 317.

There are six specimens which belong to this genus, but as they are not in perfect condition, I do not wish to pronounce any opinion as to their specific character, although they appear to be new to science. All of them were found at Calcutta, 12-viii-07, 4-ix-07, 21-x-11, Maidan; these dates show that they are obtainable in August, September and October. It is possible, therefore, to get some more specimens, so that they may be specifically determined.

### **Monochirus sthulacundus**,[1] n. sp.

Black, shining, elytra spiny, basal six joints of the antennae bare, punctate, apical 5 joints formed into a very thick club which is covered with brown pubescens, 1st joint with a spine.

Length from head to apex of elytra 4 mm.

Described from one example.

---

[1] The specific name is derived from two Sanskrit words, viz., *sthula* = thick, *cundum* = antenna.

*Locality.*—Berhampur, Murshidabad district, Bengal, 1-1-08 (*R. E. Lloyd*).

*Type* in the Indian Museum, Calcutta.

*Fuller description.*

*Head* rugose, coarsely punctate, a fine groove from the vertex runs down the middle, an incomplete ridge enclosing a row of short brownish hairs round the eyes; basal 6 joints of the antennae black, bare, and punctate, apical 5 joints form a very dilated, round club which is covered with reddish brown pubescence, basal joint bearing a long spine on the dorsal side, 2-4 joints small, rounded, 5-6 joints subequal and together as long as 2, 3, and 4, apical joint pointed.

*Prothorax* more opaque than the elytra, as long as broad, narrowed in front, lateral margins rounded; surface coarsely punctate, covered with brown pubescence; a bare longitudinal area in the middle, the bare area is more or less elevated; two transverse shallow depressions; two pairs of bifid and erect spines on the front margin, one pair of similar bifid spines and a single one on each lateral margin; base bare, transversely channelled; each of the four lateral angles ends in a minute blunt tooth.

*Elytra* shining, sides parallel, rounded at the apex, deeply and coarsely punctate-striate, thinly covered with stout and erect spines, the marginal row of spines horizontal.

*Legs* short, stout, punctate, sparsely covered with brown pubescence; a pointed tooth on the underside of the fore femora, 3 in similar positions on each of the mid and hind ones, fore and hind tibiae straight, emarginate at the apices, mid tibiae curved.

## Genus **Hispella**, Chap.

Chapuis, *Gen. Col.* XI, 1875, p. 334.
Weise, *Ins. Deutschl.* VI, 1893, p. 1061 and 1064.
Weise, *Deut. Ent. Zeit.* 1897, p. 143.

In erecting *Hispella* as a subgenus of *Hispa*, Chapuis stated the characters as follows:—

"Antennes de 11 articles, courtes, et ne dépassant pas la base du pronotum, comprimées et spinuleuses, 1 article assez gros, prolongé en dessus en une longue épine *arquée en avant*, 2 plus court, muni d'une spinule plus courte, 3-6 *légèrement dilatés de la base à l'extrémité, les angles de celle-ci assez saillants, les supérieurs plus que les inférieurs*, 7 en cône, 8-10 transversaux, trés-serrés, 11 aigu à l'éxtrémité, pattes courtes et robustes, *tibias droits, comprimées, dilatés au bord externe*, anguleux et souvent épineux avant l'extrémité.

"Cette division a pour type la *Hispa atra*, de Linné, qui habite les contrées tempérées et méridionales de l'Europe."

The italics are mine.

At present *Hispella* comprises six species, including the type *H. atra*, L., from which the above description is taken. The other

five species are all from the Indian region. The Indian forms differ from the type in the following characters:—

(1) The long dorsal spine of the first joint of the antenna is not bent forward.

(2) 3-6 joints of the antennae are not dilated as in *H. atra*, L.

(3) The tibiae are not dilated as in *H. atra*, L.

The middle tibiae in the Indian forms are curved, which is not so in the case of *H. atra*, L.

The differences of the characters between the type and the Indian forms, the homogeneity of those of the Indian forms, and the fact that *H. atra*, L. is found in the temperate zone, all point to the conclusion that the Indian forms may be separated and formed into a new genus. On the other hand it may be pointed out that a slight gradation in the characters is noticeable in the Indian forms. I do not, therefore, propose to separate them at present, unless more material from the Indian region establishes this fact beyond doubt.

Instead, for the sake of convenience, I shall characterise the genus as follows:—

*Antennae.*—1-6 joints spiny, 3-6 may be dilated, apical 5 joints forming a club.

*Claws.*—Completely separate.

*Tibiae.*—Straight, dilated or not dilated, middle tibiae may be curved.

A table will distinguish the forms thus:—

| | | |
|---|---|---|
| 1. | 3-6 joints of antennae dilated (flattened) | *atra*, L. |
| 2. | 3-6 joints of antennae not dilated | 3 |
| 3. | Antennae short, stout, 1st joint with 5 dorsal spines | *brachycera*, Gestro. |
| 4. | Antennae long, slender, 1st joint with less than 5 dorsal spines | 5. |
| 5. | 1st joint of antennae with 4 dorsal spines, 2nd joint with 2 dorsal spines | *stygia*, Chapuis. |
| 6. | 1st joint of antennae with less than 4 dorsal spines | 7. |
| 7. | 1st joint of antennae with 3 dorsal spines, 2nd joint with 1 dorsal spine | *ramosa*, Gyll. |
| 8. | 1st joint of antennae with 2 dorsal spines, one very minute | *andrewesi*, Weise. |

Owing to the reasons stated by Weise (*Deut. Ent. Zeit.* 1897, p. 127) I do not include Motschulsky's species *ceylonica* in this table.

### Hispella stygia, Chap.

Chapuis, *Ann. Soc. Ent. Belg.* XX, 1877, p. 51.
Gestro, *Ann. Mus. Civ. Gen.* 1897, p. 124, f. 14.
Weise, *Deut. Ent. Zeit.* 1897, p. 126.

*Locality.*—This example has "Bombay" on its label. I have seen other specimens taken at Belgaum which is in the Bom-

bay Presidency. This specimen may have been taken at the same place.

### Hispella ramosa, Gyll.

Gyll. in Schonh., *Syn. Ins.* I, 3, App. 1817, p. 6.
Gestro, *Ann. Mus. Civ. Gen.* 1897, p. 124, f. 13.

*Localities.*—Paresnath, W Bengal, 4,000-4,400 ft., 15-iv-09 (*Annandale*); Bangalore, S. India, 3,000 ft., 15-x-10 (*Annandale*); Dhikala, Naini Tal District, U.P., 26-iv-08 (*Mus. Collr.*). Three examples.

This species is apparently confined to the hills.

### Hispella andrewesi, Ws.

Weise, *Deut. Ent. Zeit.* 1897, p. 126.

*Locality.*—Monda, Nepal, 12-v-08 (*Mus. Collr.*) One example.

The spines on the first and second joints of the antennae being broken, I doubtfully indentify this example. There is also a difference in the colour of the elytra, but no structural difference is observable. *H. andrewesi*, Ws. was taken at Kanara.

## Genus **Rhadinosa**, Weise.

Weise, *Deut. Ent. Zeit.* 1905, p. 318.

### Rhadinosa laghu,[1] n. sp.

Oblong, small, not thickset as the other members of this genus, black, with a faint metallic sheen, in some specimens the colour is a mixture of testaceous and black, subnitid, thoracic and elytral spines are long and slender as compared with the size of the insect, sparsely covered with white adpressed hairs; elytra deeply punctate-striate; besides these deep punctures, the surface is very minutely punctate. This character distinguishes this species from all others of the genus.

Length from head to apex of the elytra 3-5 mm.

Described from 15 examples.

*Type* in the Indian Museum, Calcutta.

*Localities.*—12 examples from Calcutta, 3—4-viii-07 (*N.A.*); Mangaldai, Assam, 16—18-x-10 (*Kemp*); Siliguri, base of E. Himalayas, 3—4-vi-1911 (*N.A.* and *S.K.*); Basanti, Forest Station, 24 Parganas, Sunderbuns, 16-xi-09 (*T Jenkins*).

*Fuller description.*

*Head* coarsely punctate, not rugose, from the vertex to a point between the bases of the antennae deeply sulcate, a row of

[1] *Laghu* is a Sanskrit word meaning light. The name is applied to this species in reference to its light build.

white hairs round the eyes, a few similar hairs on other parts of the head; antennae long, slender, thickened towards the apex, apical 5 joints form a club, thickly covered with brownish pubescence, apical joint bluntly pointed, basal joint long and stout, with a long dorsal spine pointing forward, 2nd joint short and rounded, 3rd, 4th, 5th joints longer than 2nd, and almost equal to each other in length, 6th joint shorter than the preceding ones, 1st-6th joints with a few scattered white hairs.

*Prothorax* quardrate, as long as broad, lateral margins rounded, two pairs of bifid spines in front, on each lateral margin one pair of bifid spines, the space enclosed between these spines is rugose and coarsely covered with short white hairs, on the portion of the disc posterior to the single lateral spines is a shallow transverse depression, each of the 4 anterior and posterior angles of the prothorax ends in a blunt tooth.

*Scutellum* finely punctate, apex rounded, in the ♀ rather broader than long, slightly depressed in the middle, apex widely rounded.

*Elytra* sparsely covered with short white hairs, thinly covered with long spines, marginal row horizontal.

*Underside.*—Legs finely punctate, mid tibiae curved, all the femora with 3 small, pointed, curved teeth on the underside, the third tooth may be very minute.

### Rhadinosa girija,[1] n. sp.

Oblong, black , shining, sparsely covered with long, erect, brownish hairs, as compared with the size of the insect, the prothoracic and elytral spines are short and stout. The structure of the disc of the prothorax distinguishes it from all others.

Length from head to apex of elytra 4 mm.

*Locality.*—Chutri Gouri, Nepal Terai, 26—27-iv-07 (*Mus. Collr.*). One example.

*Type* in the Indian Museum, Calcutta.

#### *Fuller description.*

*Head* rugose, forehead depressed in the middle, interantennal space elevated into a sharp ridge, spaces between the bases of the antennae and the eyes are also elevated; antennae thickest in the middle, *i.e.* the 7th joint is the thickest, gradually becomes thinner towards the apex, apical 5 joints form a club, covered with brownish pubescence, basal joint long, stout, with a dorsal stout spine, 2nd joint short, rounded, 3rd joint longest, 4-6 joints equal in length, basal 6 joints bare.

*Prothorax* quadrate, almost as long as broad, narrowed in front, lateral margins rounded, 2 frontal (bifid), 2 marginal (bifid), 2 marginal (single) spines, short and stout. The surface of the disc

[1] The specific name is derived from a Sanskrit word *giri*, meaning mountain, *girija* = originating in a mountain.

is broken up into many shallow hollows. In the centre there is a shining depressed elevation. Posterior to the single marginal spines the portion of the disc is a shallow and wide depression. Base smooth; each of the four anterior and posterior angles ends in a small blunt tooth.

*Scutellum* as long as broad, finely punctate, apex rounded.

*Elytra* punctate-striate, punctures large and shallow, the spines short and stout.

*Underside* black, shining, legs short, femora with a small tooth on the underside, mid tibiae curved.

There are two specimens of this genus from Shillong. They appear to be new to science. I do not describe the species because the examples are not perfect.

### Asamangulia,[1] new genus.

Body elongate, antennae 11-jointed, 1st joint with a dorsal spine, claws completely separate, unequal, inner claw being smaller than the outer; frontal and marginal spines of the prothorax short, robust, and suberect. Elytra punctate-striate, tuberculate or spinose, with a row of horizontal marginal spines, at the apex the spines are longer.

This genus is distinguished from all the other genera of the Hispini by the *unequal claws and the single dorsal spine on the first joint of the antennae.* I attach generic importance to the inequality of the claws, because, since Chapuis laid stress on the character of the claws in founding the genus *Monochirus* in 1875, they have been found useful in separating the spiny Hispinae into genera. Except in the present case, however, the claws have not been found unequal, although they have afforded many other characters.

*Asamangulia*, n.g., is related to *Phidodonta*, Ws., by the form of the body, and to *Rhadinosa*, Ws., by the completely separated claws. I place the new genus *Asamangulia* after the genus *Brachispa*, Gestro.

### Asamangulia cuspidata, n. sp.

Elongate, black, shining; prothorax sparsely covered with brownish adpressed hairs. Apical 5 joints of the antennae form a pointed club and are covered with reddish brown pubescence. Scutellum depressed in the middle. Elytra deeply punctate-striate, cuspidate; these cusp-like tubercles on the elytron are smaller at the base of the elytron, becoming larger (almost stout spines) towards its apex.

Length from head to apex of elytron 5-6 mm.

*Locality.*—Pusa, Bihar. Eleven examples.

*Type* in Mr. Andrewes' collection, London.

*Co-types* in Genoa Museum of Natural History, in the Indian Museum and in the British Museum.

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[1] The generic name is derived from two Sanskrit words: *asama* = unequal, *anguli* = claw.

*Fuller description.*

*Head* rugose, prominently elevated round the bases of the antennae ; antennae thickest in the middle, 1st joint large, dorsally produced into a long spine; 2nd joint small, rounded; 3rd joint longest ; 4-6 joints subequal ; 2-6 joints surface strigose.

*Prothorax* more opaque than the elytra, disc rugose, with two transverse depressions, a longitudinal deep furrow down the middle, sides rounded, front margin with two pairs of bifid spines, a few longer hairs between these spines, each lateral margin with one pair of bifid spines and a single one; the spines are short, stumpy and suberect.

*Scutellum* rounded, punctate, depressed in the middle.

*Elytra* deeply punctate-striate.

*Mid tibiae* curved.

## Genus **Dactylispa**, Ws.

Weise, *Deut. Ent. Zeit.* 1897, p. 137.
Weise, *Arch. f. Naturg.* 1899, p. 265.
*Podispa*, Chap., *Gen. Col.* XI, 1875, p. 335 (pars.).
*Hispa*, Chap., *Gen. Col.* XI, 1875, p. 333 (pars.).
*Monohispa*, Ws., *Deut. Ent. Zeit.* 1897, p. 147.
*Triplispa*, Ws., *l.c.*, 1897, p. 147.
Gestro, *Bull. Soc. Ent. Ital.* 1902, p. 59.

### **Dactylispa spinosa**, Weber.

Weber, *Obs. Ent.* 1801, p. 65.
Fabr., *Syst. El.* II, 1801, p. 58.
Gestro, *Ann. Mus. Civ. Gen.* 1897, p. 86 (*Hispa*).
,, *Bull. Soc. Ent. Ital.* 1902 (1903), p. 150.

*Locality.*—Sarawak, Borneo (*C. W Beebe*). Two examples.

In the latest catalogue of the Hispinae by Weise, it is not mentioned that *H saltatrix*, F. is a synonym of this species of Weber's.

## Genus **Hispa**, L.

Linné, *Syst. Nat.* ed. XII, 1767, p. 603.
Chapuis, *Gen. Col.* XI, 1875, p. 334.
Weise, *Ins. Deutschl.* VI, 1893, p. 106.
Weise, *Deut. Ent. Zeit.* 1897, p. 137.
*Dicladispa*, *Gestro*, *Ann. Mus. Civ. Gen.* 1897, p. 81.
,, ,, *l.c.*, 1899, p. 329.

### **Hispa armigera**, Oliv.

Oliver, *Ent.* VI, 1808, p. 763, t. 1, f. 8.
*cyanipennis*, Motsch., Schrenck's *Reise Amur.* II, 1861, p. 238.
*aenescens*, Baly, *Journ. Asiat. Soc. Beng.* 1887, p. 412.
*aenescens*, Cotes, *Ind. Mus. Notes*, 1889, p. 37.
Gestro, *Ann. Mus. Civ. Gen.* 1890, p. 248.
Gestro, *Ann. Mus. Civ. Gen.* 1897, p. 82.
Ws., *Deut. Ent. Zeit.* 1904, p. 457.

*Localities.*—Calcutta, 2-xi-07, 22-v-09, 28-viii-06, 14-viii-06, 12-ix-07; Howrah, near Calcutta; Midnapore and 24 Parganas,

Lower Bengal (*Cotton* and *Lyall*); Goalbathan, East Bengal, 10-vii-09 (*R. Hodgart*); Balighai, near Puri, Orissa coast, 16—20-viii-11; Malabar district, W India (*E. Thurston*); Mandalay, U. Burma (*H.M.S. Matthews*); Khulna, E. Bengal (*Rainy*); Mungphu, near Darbhanga, N. Bengal (*H. S. Beadon*); Sibsagar, Assam; Backergunge, E. Bengal; Bilaspur, Darbhanga, N. Bengal (*G. W Llewhelin*); Saraghat, N. Bengal; Katmundu, Nepal. Eighty-four examples and about 412 in alcohol.

*Distribution.*—This insect has a wide distribution. Dr. Modigliani reports it from Sumatra: Siboga, Baligha, Pangherangpisang and Pedang (ref. 6). Nothing about the food-plant of this insect in these localities is mentioned. In India it is a pest of the Rice plant.

Weise has sunk Motschulsky's species *cyanipennis* as a synonym of *armigera*, Oliv. (ref. 7). Comparing Motschulsky's description (ref. 2) with Olivier's, and also Baly's, I find no reason why *cyanipennis*, Mots. should be considered as a synonym of *armigera*, Oliv. Motschulsky writes: "Corslet assez lisse, *sans epines dorsals*; elytra fortement ponctuees *avec quatre epines sur leur milieu.*" Olivier in his description of *armigera* says: "Le corcelet est armee de cinq epines de chaque cote; la quatra anterieures ont une base commune; la cinquieme la plus courte de toutes, est places un peu au-dila. Les elytres sont d'un bleu fonce luisant; elles sont des points enfonces et un grand nombre d'epines." Baly's description of *aenescens* (ref. 4) runs as follows:—"Thorace rugoso-punctato lateribus anti medium spinis quatuor, basi connatis et pone medium spina unica armatis; elytris anguste oblongis, fortiter seriato-punctatis, spinis validis triseriatium dispositis instructis."

From the above it is evident that *cyanipennis*, Mots., cannot be a synonym of *armigera*, Oliv.; *cyanipennis* has no spines on the thorax and only four spines on the elytra. In his description I have italicised these portions. *Armigera*, Oliv., and *aenescens*, Baly, the descriptions of which agree well, both have five spines on the thorax and a great many on the elytra. In the absence of any reason from Weise for sinking *cyanipennis*, Mots., I consider it necessary to point out that Motschulsky's description does not warrant it. The type of *cyanipennis* is supposed to exist in the Museum of the University of Moscow.

## Genus **Platypria**, Guér.

Guérin, *Revue Zool.* 1840, p. 139.
Chap., *Gen. Col.* XI, 1875, p. 336.
Gest., *Ann. Mus. Civ. Gen.* 1890, p. 229.
,, *l.c.*, 1897, p. 110; l.c., 1905, p. 515.

### **Platypria echidna**, Guér.

Guér., *Rev. Zool.* 1840, p. 139.
Gest., *Ann. Mus. Civ. Gen.* 1890, p. 246, fig.; 1897, p. 112.

*Localities.*—The Nilgiris; Kanara. Two examples.

### Platypria hystrix, F.

Fabr., *Suppl. Ent. Syst.*, 1798, p. 116.
Fabr., *Syst. El.* II, 1801, p. 59 (*Hispa*).
Guérin, *Rev. Zool.* 1840, p. 140.
Gestro, *Ann. Mus. Civ. Gen.* 1897, p. 113.
*erinecea*, Oliv., *Ent.* VI, 1808, p. 762, t. 1, f. 6 (*Hispa*).
*digitata*, Gest., *l.c.*, 1888, p. 178.

*Localities.*—Sadon, U. Burma, alt. 5,000 ft., April, 1911 (*E. Colenso*); Katmundu, Soondrijal, Nepal; Calcutta, 4-vii-1907. Four examples.

### Platypria erinaceus, F.

Fabr., *Syst. El.* II, 1801, p. 59 (*Hispa*).
Ill., *Mag.* III, 1804, p. 169.
Guér., *Rev. Zool.* 1840, p. 141.
Gest., *Ann. Mus. Civ. Gen.* 1897, p. 111.
Var. *bengalensis*, Gest., *l.c.*, 1897, p. 112.

*Locality.*—Jafna, Ceylon, June 1910. One example.

# XXII NOTES ON PEDIPALPI IN THE COLLECTION OF THE INDIAN MUSEUM

## V.—Tartarides collected by Mr. B. H. Buxton in Ceylon and the Malay Peninsula.

*By* F. H. Gravely, *M.Sc.*, *Assistant Superintendent, Indian Museum.*

A valuable collection of Pedipalpi has recently been presented to the Indian Museum by Mr. B. H. Buxton, who obtained them in Ceylon and the Malay Peninsula when collecting further material for his work on Arachnid morphology. The Thelyphonidae and Tarantulidae will be dealt with in papers dealing with the Indo-Australian members of these groups as a whole. The time does not, however, appear to be ripe for the preparation of a general account of the Tartarides, of which group Mr. Buxton's specimens form the subject of this paper.

The chief points of interest brought out by Mr. Buxton's collection of Tartarides are (1) the unsatisfactory nature of the distinction between *Schizomus* and *Trithyreus*[1], a distinction involving the separation into different subgenera of such obviously allied species as *crassicaudatus* and *perplexus*; and (2) the increasing number of Oriental species whose females closely resemble the Papuan *modestus*, Hansen. It seems to me undesirable to go on describing these species in the absence of males on the basis of measurements alone.

### Schizomus (Trithyreus) perplexus, n. sp.

*Locality.*—Polonuruwa, North-Central Province, Ceylon (under bricks 4 ♂ ♂, 1 ♀; under leaves 1 ♀ and several young).

♂ *Cephalothorax.*—Eye-spots absent. Cephalic sternum about as long as broad.

*Arms.*—Nearly as long as the body. Trochanter slender as in *S.* (*s. str.*) *crassicaudatus*[2]; lower margin lightly sinuous, convex basally, convex distally; anterior angle long and spiniform, directed slightly upwards, with a similar but somewhat smaller, lightly upturned process arising on the inner side at its base; anterior margin strongly convex. Femur with a ventral tubercle at the base as in *S. crassicaudatus*, but prolonged beyond this, the total length of the ventral margin in front of the trochanter being more

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[1] See Hansen and Sörensen, *Arkiv för Zoologi* II (8), 1905, pp. 33-34.

[2] See Hansen and Sörensen, *Arkiv för Zoologi* II (8), 1905, pp. 40-42, pl. iii, figs. 1*a*—1*i*.

than half as great as the depth of the femur at its distal end. Patella also somewhat slenderer than in *S. crassicaudatus*, the median ventral tooth shorter and not directed forwards, the margin strongly concave behind it, more lightly concave in front. Tibia concave ventrally at base, then abruptly swollen and gradually tapered; the basal concavity hidden when the arm is not extended. Upper margin of tarsus two and a half times as long as claw.

*First legs.*—Nearly half as long again as body. Coxa terminating behind base of trochanter of arm. Femur about three quarters of length of patella, slightly longer than tibia. Tibia about one-fifth as long again as foot. Foot about ten times as long as deep, deepest at end of metatarsus. Second metatarsus about three-fifths as long as whole tarsus and about equal to five

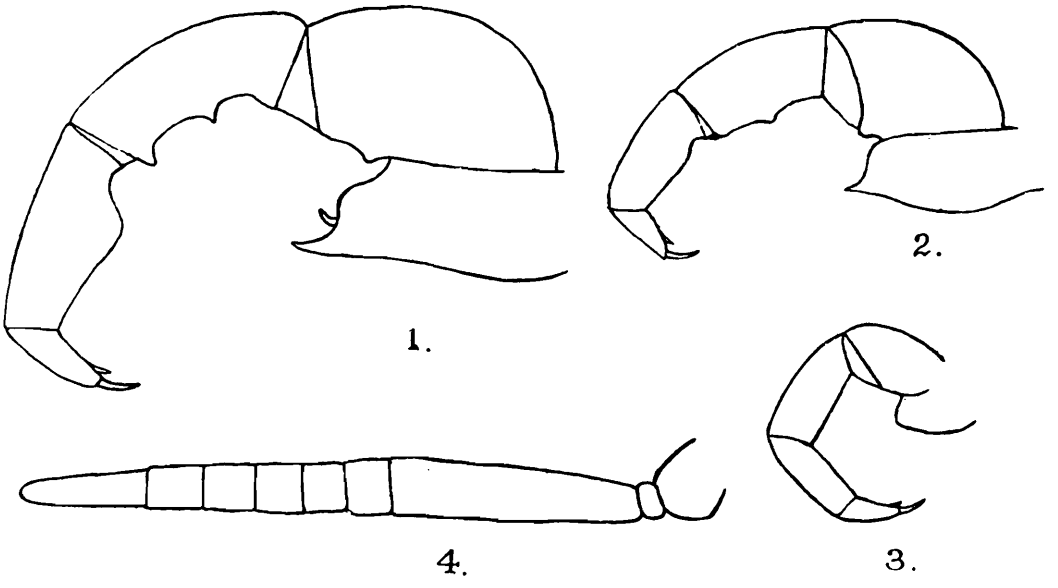


FIG. 1.—*Schizomus (Trithyreus) perplexus* ♂ left arm, × 30.
,, 2.— ,, ,, ,, ♀ ,, × 30.
,, 3.— ,, ,, *buxtoni* ♂ ,, × 30.
,, 4.— ,, ,, ,, ♂ foot of antenniform leg, × 65.

proximal tarsal joints which are subequal in length, the basal being perhaps somewhat shorter than the others.

*Fourth legs.*—Femur slenderer than in *S. crassicaudatus*, about two and a third times as long as deep.

*Tail.*—Resembles that of *S. crassicaudatus*.

♀ *Cephalothorax.*—As in the male.

*Arms.*—About three-quarters the length of the body. Trochanter with both margins lightly and evenly convex, practically straight; anterior angle less strongly produced than in male, a small spine present on inner surface some distance from it. Femur shorter than in male, free ventral margin not longer than basal tubercle. Lower margin of patella biconcave; ventral spine represented only by a tubercle between these concavities. Ventral margin of tibia concave basally, then lightly swollen. Upper margin of tarsus twice as long as claw.

*First legs.*—Nearly a quarter as long again as body. Coxa terminating behind base of trochanter of arm. Femur about three quarters length of patella, about as long as tibia. Tibia about a quarter as long again as foot. Foot about ten times as long as deep, deepest at end of metatarsus. Second metatarsus scarcely as long as sum of five proximal tarsal joints, about half as long again as terminal tarsal joint. First tarsal joint slightly shorter than any of the succeeding four.

*Fourth legs.*—Like those of male.

*Tail.*—Long and slender, about six times as long as deep. Basal joint nearly twice, second scarcely more than once as long as deep. Separation of third and fourth joints obscure.

*Colour of both sexes.*—Pale reddish brown, the abdomen and legs faintly greenish.

*Length.*—♂ about 3·5, ♀ about 3·0 mm. The arms of the male show this species to be closely related to *Schizomus* (*s. str.*) *crassicaudatus* from Ceylon; but its thoracic terga have the structure characteristic of the subgenus *Trithyreus*.

The distinctive features of the arms are fully developed in large specimens only. They are scarcely distinguishable in small ones, which are often most difficult to distinguish from immature specimens of the next species.

### Schizomus (Trithyreus) buxtoni, n. sp.

*Localities.*—Polonuruwa, North-Central Province, Ceylon (several ♂♂, ♀♀; under bricks, many under leaves); Minneriya, North-Central Province (3 ♂♂); Sigiri, Central Province (many ♂♂, ♀♀).

♂ *Cephalothorax.*—Eye-spots absent. Cephalic sternum slightly longer than wide.

*Arms.*—Slender and of moderate length, without distinctive tubercles or spines. Trochanter with lower margin distinctly convex, anterior angle obtuse and more or less rounded with a small spine on the inner side behind it, anterior margin practically straight. Femur slender, with free ventral margin about equal to anterior margin of trochanter. Claw about half as long as upper margin of tarsus.

*First legs.*—Very slender, about one and a half times as long as body. Coxa terminating behind base of trochanter of arm. Femur much shorter than patella (7 : 9), slightly longer than tibia, much longer than foot (7 : 5). Second metatarsus about as long as five succeeding tarsal joints, which increase regularly in length from basal to distal.

*Fourth legs.*—Femora fully two and a half times as long as deep.

*Tail.*—Somewhat like that of *S. suboculatus*, but the disc broader and more evenly rounded behind, with the sides more convex distally—sometimes almost circular or even squarish. When seen from the side it lacks the profound dorsal excavation seen in Hansen and Sörensen's figure of that species.

♀ Closely resembles the male in general features, but the first legs are only about twice as long as the body. The tail is slender, being about five times as long as deep. The first joint is longer than the second, which is scarcely as long as broad. The first and second joints combined are scarcely as long as the third and fourth which are indistinctly separated.

*Colour of both sexes.*—Pale brown, sometimes with a greenish tinge in large specimens.

*Length.*—Up to about 3 mm.

This species seems to be allied to *S. vittatus*[1], but is paler and usually browner in colour, and lacks the eye-spots so conspicuous in that species. The tail of the female (the only sex known in *S. vittatus*) is, moreover, much slenderer, and lacks the swelling characteristic of that species.

**Schizomus (Trithyreus)** spp. *aff.* **modestus,** Hansen.

*Localities.*—Malay Peninsula (outside Kubang Tiga and Jerneh caves, Perlis; Grik and Lengong, Perak).

The specimens, although fairly numerous, are all female or immature. The terminal joint of the tarsus of the antenniform legs is somewhat more than half as long as the metatarsus, as in *S. modestus*,[2] which the specimens appear to resemble in a general way, as do also the females of *S. vittatus*,[1] *greeni*,[3] *buxtoni*, etc. In the absence of any really definite characteristics, such as would doubtless be found in the tail of the male, it seems undesirable either definitely to record the Papuan species from the Malay Peninsula, or to provide the specimens before me with a new specific name. It is possible that more than one species may be represented.

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[1] *Schizomus* (*Trithyreus*) *vittatus*, Gravely, *Spolia Zeylanica* VII, 1911, pp. 138-139, text-fig. 2*c*.

[2] *Trithyreus modestus*, Hansen and Sörensen, *Arkiv för Zoologi* II (8), 1905, pp. 63-65, pl. vi, figs. 3*a*-3*f*.

[3] *Schizomus* (*Trithyreus*) *greeni*, Gravely, *Rec. Ind. Mus.* VII, 1912, p. 109, text-fig. B.

# XXIII NOTES ON ORIENTAL DRAGON-FLIES IN THE INDIAN MUSEUM

## No. 3.—Indian species of the 'Legion' Protoneura.

*By* F. F. Laidlaw.

The distribution of the species belonging to this 'Legion' in British India and Burma is very interesting, although probably still inadequately known. The species of the group have as a rule a restricted range and are all to a great extent forest-haunting insects, at least they are not commonly found in areas which have been much affected by human industry.

The museum collection contains what are, I believe, the first examples of the Legion recorded from the Himalayas. From what is known of the group it appears probable that whilst Ceylon and the Deccan are inhabited by a rich and peculiar series of species, the great river valleys have no representatives of the group, whilst the great mountain ranges of the north possess few species, only one, namely that here described as a new species under the name of *Protosticta carmichaeli*, being recorded. Burma shows a distinct Malayan influence in the possession of three species, all with a range right down the Malay Peninsula. With the somewhat scanty material available it is impossible to dogmatize as to the distinctness of the Ceylon fauna from that of the Deccan. But it may be noted that whilst *Disparoneura quadrimaculata* (Ramb.) appears to be common in the Satara district, and was first recorded from 'Bombay', it does not occur amongst the material collected in Cochin State by Mr. Gravely, and so far as I know is not recorded from any locality so far south. Further, it is worth remark that none of the species from Ceylon have been recorded from the mainland, and also that no mainland species is known from Ceylon. The sole exception is *Platysticta maculata*, Selys, which has a distinct representative race in Cochin State readily distinguished from the typical Ceylon form. The following table shows the recorded species with their known distribution.

Ceylon.

| | | | |
|---|---|---|---|
| *Platysticta maculata*, Selys. | | *Platysticta tropica*, Selys. | |
| ,, | *apicalis*, Kirby. | * ,, | *hilaris* (Hagen). |
| ,, | *montana*, Selys. | ,, | *digna*, Selys. |

Species marked thus * are represented in the museum collection.

*Disparoneura caesia* (Selys). *Disparoneura sita*, Kirby.
,, *centralis* (Selys). ,, *oculata*, Kirby.
,, *tenax* (Selys).

S. India.

(Nilgiri Hills; Cochin State.)

*Disparoneura westermanni* (Selys).
,, *gomphoides* (Ramb.).
**Platysticta maculata deccanensis*, subsp. n.
**Protosticta gravelyi*, sp. n.

Bombay Presidency.

**Disparoneura quadrimaculata* (Hagen).

Himalayas.

(Darjiling District).

**Protosticta carmichaeli*, sp. n.

Burma-Assam.

*Platysticta quadrata*, Selys. *Disparoneura verticalis* (Selys).
*Disparoneura atkinsoni*, Selys. ,, *interrupta* (Selys).

**Platysticta maculata deccanensis**, subsp. n.

(Text-fig. 1.)

$\frac{8.2.30}{20}$ 5 ♂♂, Kavalai, Cochin State, 24—27-ix-14 (in spirit).

Length of abdomen 45 mm., of hind-wing 32·5 mm.

Differs from the typical race from Ceylon as follows:—

The prothorax is dark brown above. The thorax is brown without markings save for a fine black line along the mid-dorsal carina. The brown colouring becomes paler on the sides and ventrally.

Segments 8-9 of the abdomen vivid turquoise blue above. Segment 10, which is very short, is entirely black.

I have figured the anal appendages of the male; they are evidently very similar to those figured by Kirby for his *Platysticta greeni*, which he subsequently regarded as a synonym of *P. maculata*, Selys (see Kirby, *Proc. Zool. Soc. Lond.*, 1891, p. 203, pl. xx, figs. 3, 3*a* and *J. Linn. Soc.* XXIV, p. 561, 1893).

Fig. 1.—Anal appendages of one side of *Platysticta maculata deccanensis* ♂, seen rather obliquely from above.

Species marked thus * are represented in the museum collection.

## Platysticta hilaris (Hagen).

*Platysticta hilaris*, Kirby, *Cat. Odonata*, p. 132 (1890).
,, ,, *id.*, *J. Linn. Soc.* XXIV, p. 562 (1893).

$\frac{6\,5\,4\,5}{2\,0}$ 1 ♂, Kandy, Ceylon, 21-i-10.

The prothorax in this specimen appears to be uniformly dark on the dorsal surface. The middle lobe of the prothorax carries a pair of small rounded bosses, one on either side of the middle line. The colouring of the abdominal segments is evidently much faded, but the specimen is, I believe, identical with that described in de Selys' synopsis under this name.

## Protosticta gravelyi, sp. n.

(Text-fig. 2.)

$\frac{8\,2\,3\,1}{2\,0}$ 1 ♂ 1 ♀ Kavalai, 1300-3000 ft., Cochin State, 24—27-ix-14 (spirit specimens).

♂ Length of body 44 mm., of hind-wing 21 mm.

Head, under surface brownish black, upper lip, genae and anteclypeus white, the upper lip with a fine black margin, the rest of the dorsal surface black.

Prothorax white; a black triangle occupies the posterior lobe and its apex extends forward on to the middle lobe. Thorax black, with a metallic lustre on the dorsum; laterally marked with two moderately broad bands of white, of which the anterior encloses the stigma; ventral surface black, but the infra-episternum is white.

Abdomen, segments 1-2 black above, sides and ventral surfaces white, but the genital appendages on 2 are tinged with dark brown. Segments 3-7 each with a white sub-basal ring, which laterally and ventrally is more extensive than it is dorsally. In the case of segment 7 the white mark is divided dorsally by a fine longitudinal line which is black, and it occupies about the first third of the dorsum of the segment; ventrally it extends for two-thirds of the length of the segment. On end of segments 3-6 the white mark is much less extensive occupying only a small fraction (one-tenth or less) of the dorsum of the segment. There are no markings on segments 8-10 which are entirely black.

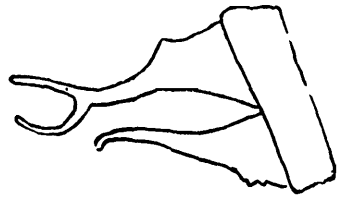


FIG. 2.—Anal appendages of *Protosticta gravelyi* ♂, seen from the side.

The relative length of the abdominal segments is as follows:

1 2½ 9 9 10 10 8 3 1 ½.

Legs white, with black ridges and cilia.

Anal appendages about twice as long as segment 10. Upper pair stout at their bases with a small angular projection on their inner side; curved inwards and downwards, strongly chelate at their distal extremities. Lower pair rather slender, simple, curved

a little upwards, shorter than the upper pair. Colour entirely black.

Venation, 13 postnodals. Pterostigma rather large, covering one and a half cells, its anal margin longer than the costal and its inner side oblique. $M_3$ rising from nerve descending from nodus, *Rs* one cell more distal. The rudiment of $Cu_2$ lies rather nearer the level of the second antenodal nerve than of the first.

The female specimen is very immature and too much macerated for measurement. It is possible to determine that the colouring is generally similar to that of the male, but that segments 8 and 9 of the abdomen have white lateral markings; also that the posterior lobe of the prothorax is simple and that segment 8 of the abdomen is about equal in length to segment 9.

This species is readily distinguished from other members of the genus by the remarkable chelate superior anal appendages of the male.

**Protosticta carmichaeli**, sp. n.

(Text-fig. 3.)

C.c. 1066-67 2 ♂ 2 ♀, Darjiling Dist.: Singla, 1500 ft. (spirit specimens, all in poor condition).

♂ Length of abdomen 35 mm., of hind-wing 22 mm.

Head, upper lip bluish-white, the whole of the rest of the dorsal and posterior surfaces bronze-black.

Prothorax and thorax also bronze-black dorsally; underneath dull black.

Abdomen, segment 1 dark brown. Segments 2-6 yellowish-brown, darker in the middle part of the segment. Each segment has a light apical ring and a dark terminal ring. Segment 7 is all dark brown save for a small apical ring which is light yellowish-brown. The three terminal segments are uniformly black, the tenth segment is very short.

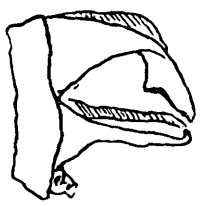


FIG. 3.—Anal appendages of *Protosticta carmichaeli* ♂, seen a little obliquely from the left side.

The legs are yellowish-brown, with cilia of the same colour. Anal appendages black, upper pair more than twice as long as the tenth segment. They are Λ-shaped when seen in profile; towards its distal extremity each is flattened a little from side to side. The lower pair is shorter than the upper pair, cylindrical and nearly straight; each curves inwards a little at its free extremity.

Venation, 13 postnodals on the fore-wing. Pterostigma covering one cell, its anal margin a very little longer than its costal. $M_3$ rising from nerve descending from nodus, *Rs* about one cell distally. Rudiment of $Cu_2$ half-way between level of first and second antenodals.

The condition of the female specimens is such as to make description impossible. Generally speaking the colouring is similar to that of the male. The posterior margin of the prothorax is simple.

## Note on the genus *Protosticta*.

Seven species of this genus have been named. It ranges from S. India, the Himalayas and the Malay Peninsula to Borneo and to Celebes. The genus appears to be a specialized form derived from *Platysticta*. It is even possible that the genus is polyphyletic, and in support of this view one might urge that *P. gravelyi* bears a very strong resemblance to the large species of *Platysticta* which occur in Ceylon, whilst the Bornean species resemble rather the small Malayan *Platystictas*. On the other hand all the species of *Protosticta* are alike in the great relative length of the very slender abdomen, and generally in venation; whilst the rather large Celebesian species resemble the large Ceylon *Platysticta* spp.

### **Disparoneura quadrimaculata** (Ramb.).

*Disparoneura quadrimaculata*, Selys, *Bull. Acad. Belg.* (2) X, p. 446 (1860).
,, ,, *id.*, *Mem. Cour.* XXXVIII, p. 163 (1836).
,, ,, Kirby, *Cat. Odonata*, p. 133 (1890).

$\frac{6}{2}\frac{5}{0}\frac{1}{0}$ 1 ♂ 1 ♀ (pinned), Medha, Yenna Valley, Satara district, *ca.* 2200 ft., 17-iv-12 (*F. H. Gravely*).
$\frac{6}{2}\frac{5}{0}\frac{6}{0}$ 4 ♂ 1 ♀ (in spirit), from the same locality.

# XXIV. NOTES ON ANT-LIKE SPIDERS OF THE FAMILY ATTIDAE IN THE COLLECTION OF THE INDIAN MUSEUM.

*By* KARM NARAYAN, *M.Sc., Professor of Biology, St. John's College, Agra.*

(Plate XXXII.)

The present paper describes the ant-like spiders of the family Attidae in the Indian Museum collection. Most of the specimens have been collected in Bengal, while a few from Ceylon, Madras and other places have also been described.

The work of identifying these spiders has been rather laborious, as the family Attidae has not been studied systematically in India so far. Mr. Gravely, in a recent paper (*Rec. Ind. Mus.* XI, p. 257, 1915), has called attention to the neglect which the study of spiders has met with in India. The remark applies much more forcibly to the Arachnomorph spiders than the Mygalomorphs. Pocock, in the "*Fauna of British India (Arachnida)*", omits the family Attidae altogether and says, "The group contains a vast number of species and is very imperfectly known—so imperfectly that no satisfactory account of it can at present be given." The most complete work on ant-like spiders is Peckham's "*Ant-like Spiders of the family Attidae*" published in 1892, but since then a good deal of work has been done and the literature added to. It is rather unfortunate that the literature relating to species of these spiders already described is extremely scattered and the descriptions are mostly brief and very often no diagrams are given. In certain cases immature specimens have been made the basis of new species. However, I have followed McCook who, in his book "*American Spiders and their Spinning Work*," says that the epigynum and male palpus are essential structures on which specific characters can be based with certainty and that immature specimens are not worth keeping in a collection. Consequently, I have not referred to any of the immature specimens that I came across in working out the collection, except those accompanied by adults. At the end of the paper I have put together most of the literature so far published on the species from the Oriental region of the two genera dealt with in this paper.

I have to thank my Professor, Lt.-Col. J. Stephenson, I.M.S., who very kindly obtained permission for me to work in the Indian Museum and also got a number of books for me from the research grant of the Government College, Lahore. My thanks are also due to Dr. Annandale and Mr. Gravely for their valuable sugges-

tions and kind help given while I was working at the Indian Museum.

## Harmochirus lloydii, sp. nov.

(Plate xxxii, figs. 1*a-c*.)

The genus *Harmochirus* was first described by Simon (Faune Arachnologique de l'Asie Méridionale, *Bull. Soc. Zool. de France* X, 1885, p. 440), who named his species *Harmochirus malaccensis*. Peckham describes another species which he calls *H. albi-barbis* (Spiders of the *Homalattus* Group, Milwaukee, 1895). Still a third species has been described by Thorell as *H. brachiatus*.

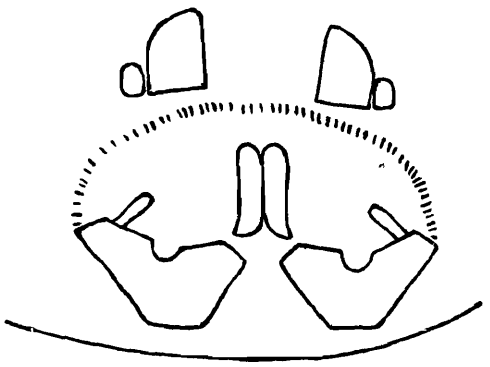
It is a curious fact that in all these descriptions only ♂ spiders have been described. I have nowhere found any descriptions or diagrams of a female *Harmochirus*. The present description is based on a female specimen collected by Major R. E. Lloyd, I.M.S., from the Calcutta Medical College compound and preserved in the Indian Museum.

*Measurements.*

Total length 3·4 mm.
Cephalothorax: length 1·4 mm.; width at dorsal eyes 1·2 mm.; cephalic part 1 mm.
Legs 1423.

The cephalic part is moderately high, but a little lower than the abdomen. The thoracic part is very short and is on a sharp declivity behind the cephalic part. The eyes of the 2nd row are nearer the 3rd than the 1st row. The anterior eyes are directed forwards but the middle and dorsal eyes are situated on the sides. The interesting point about the chelicerae in this specimen (pl. xxxii, fig. 1*b*) is that, on the inferior margin from the ventral side, the right chelicera is *fissidentate* and the left is distinctly *unidentate* (*cf.* Simon, *Hist. Nat. Araign.*, vol. ii, p. 383), but Simon includes this genus in Salticidae fissidentati. The 'pièces buccales' are shown in pl. xxxii, fig. 1*c*, and the shape of the lower lip and the maxillary process of the palp are quite different from those of *H. brachiatus* (Simon, *Hist. Nat. Araign.*, vol. ii, p. 867).

The 1st leg has the characteristic shape shown in pl. xxxii, fig. 1*a*, with the femur compressed and much dilated, claviform, and the tibia disciform and subglobose. There are black stiff bristles on both edges of the tibia together with three special sharp spines dorsally as well as ventrally. The femur of the 2nd leg is compressed, while that of the 3rd leg, as also of the 4th leg, is cylindrical.



TEXT-FIG. 1.—Epigynum of *Harmochirus lloydii*, sp. nov.

The epigynum (text-fig. 1) consists of two dark-red tubercles

which are produced both antero-laterally and internally into short processes. There is also a median elongated tubercle which seems double at its anterior end. There is a sort of a " halo " or crown of short black hairs extending from the outer extremity of one tubercle to that of the other. Rows of hairs are also seen projecting inwards from the tubercles internal to the lateral margins of the " crown." In front of the epigynum are two yellowish-white areas as shown in the diagram.

*Colour.*—The cephalothorax is dark brown, the cephalic part being covered with small white hairs which are longest towards the anterior eyes; there is a fine row of white hairs on the inferior lateral of the cephalic part. The thoracic part occupies a trapezoidal area dorsally and is devoid of hair; its posterior edge is emarginate. The falces are medium brown.

The 1st leg is medium brown except the tibia which has a dark tinge. The metatarsus is lined with black. The remaining legs are yellowish-white. The femur of the 2nd leg has a dark brown line on its anterior side, while the tibia has a black line anteriorly. The femur of the 3rd leg is black-lined anteriorly and posteriorly and the tibia only anteriorly. Also the posterior half of the femur is black-lined anteriorly and posteriorly, but the tibia only posteriorly. The sternum and lower lip are dark brown but the maxillary process of the palp and chelicerae are light brown.

The abdomen is dull brown with very few white hairs. There is, however, a group of white hairs just behind the top of the anterior end of the abdomen, where it forms a white spot. There are yellowish-white punctate spots all over the abdomen; they are arranged in regular rows and lines, running, for the most part, antero-posteriorly. There are also a few gold-coloured spots on the dorsal side of the abdomen.

KEY TO THE SPECIES OF *Harmochirus.*

I. Tibia thick but cylindrical, not flattened. No special spines besides those that are situated internally and externally on the tibia ... ... *H. albi-barbis* (♂).

II. Tibia flattened, disciform and subglobose; 3 special spines dorsally and ventrally on the tibia.

A. Lower lip longer than broad; apex of the maxillary process of the palp directed outwards ... *H. brachiatus* (♂).

B. Lower lip broader than long; apex of the maxillary process directed inwards ... ... *H. lloydii* (♀).

The following characters mentioned by Simon for *H. malaccensis* are not found in this species:

" Cephalothorax supra valde clathrato-rugosa et sat dense fulvo-squamulata. Clypeus fere glaber parcissime cinereo-setosus. Scuto nigerrimo et nitidissimo supra obtectum. Pedes I nigro-aenei metatarsis tarsisque paulo dilutioribus. Femora nigricantia supra albo-lineata, tibiae metatarsique obscure fulvi postici nigro-lineati."

### Myrmarachne plataleoides, Camb. (♂)

*Salticus plataleoides*, Cambridge, *Ann. Mag. Nat. Hist.* (4) III, p. 68 (1869).
*Salticus plataleoides*, Peckham, *Ant-like Spiders*, 1892, p. 33.

Cambridge described this species from a single specimen in the Hope collection at Oxford, the habitat of which was unknown. He, however, confirmed his identification on receiving specimens from Ceylon. Peckham also describes the species from Ceylon. There are 5 specimens in the Indian Museum collection; their localities together with the names of collectors are given below:—

Peradeniya, Ceylon (*F. H. Gravely*).
Pusa, Bihar (*F. H Gravely*).*
Sibpur, near Calcutta; 1894 (*T H. T Walsh*).*
Calcutta (*G. C. Chatterjee*).*
Calcutta (*F H. Gravely*).*

*Size.*—These specimens vary from 6 to 7·5 mm. in total length; the falces are from 2 to 5 mm. long. In at least two specimens the falces exceed the length of the cephalothorax.

Simon says, " Anterior eyes are in a straight row ", but in all the specimens, these eyes are a little recurved. The trochanter of the 4th leg is whitish and the posterior two-thirds of the abdomen ventrally and laterally is of a drab colour. There is a yellowish band in the mid-ventral line of the hinder two-thirds of the abdomen.

It is interesting to note that the tube containing the specimen collected by Mr. Gravely at Pusa also contains specimens of the ant *Oecophylla smaragdinea*, which the spider mimics. Dr. Annandale tells me that he has seen this or a very similar spider eating specimens of this ant.

### Myrmarachne incertus, sp. nov. (♀)

(Plate xxxii, fig. 2.)

This species resembles in general shape and appearance *M plataleoides* and was for some time mistaken for the latter by me, but there are important differences which justify its being placed in a different species. The following description, which embodies differences of this species from *M. plataleoides*, is based upon 3 specimens as given below :—

1. Calcutta (*N. Annandale*).
2. Pusa, Bihar (*F. H. Gravely*).
3. Pusa, Bihar.

*Measurements.*

| | Total length. | Cephalothorax (length). | (width). | Legs. |
|---|---|---|---|---|
| 1. | 7·1 mm. | 3·2 mm. | 1·4 mm. | 4132 |
| 2. | 7 mm. | 2·9 mm. | 1 mm. | 4132 |
| 3. | 8 mm. | 3 mm. | 1·5 mm. | 4132 |

* See note regarding these specimens under *M. incertus*, p. 397.

The thoracic part at its apex is almost as high as the cephalic, and not lower as in ♂ *M. plataleoides*. The cephalic part rounds off behind the dorsal eyes but not so abruptly as in *M. plataleoides*. In *M. plataleoides* the thoracic part is almost flat dorsally but in this species there is a hump just in front of the middle. There is a sharp declivity in front of the hump, but it slopes gradually behind.

The constriction in the abdomen is not so well-marked as in *M. plataleoides*; it may possibly be due to its being full of eggs.

The epigynum is characteristic (pl. xxxii, fig. 2) and serves to distinguish this species at once from the female of *M. plataleoides*, the vulva of which has an entirely different structure and shape (*cf.* Peckham, *Ant-like Spiders*, 1892, plate iii, fig. 1C). The vulva here consists of two circular white spots between which lies the genital armature. This is formed of two club-shaped masses which are fused just opposite the circular spots but diverge a good deal posteriorly; they diverge a little anteriorly but soon converge again. Posteriorly, at the meeting point of the diverging flanks, there are 2 spine-like processes, one on each side.

*Colour.*—The colours are mostly the same as in *M plataleoides*, but the abdomen is yellowish-white and is covered all over with very small polygonal areas, flaky in appearance. In one of the specimens the abdomen is flat ventrally and is depressed in the middle line.

It is worthy of note that the specimen collected by Mr. Gravely at Pusa was found along with a ♂ *M. plataleoides* and a few of the ants of the species *Oecophylla smaragdinea*. It is possible that *M. plataleoides* and *M incertus* are distinct in the female sex only, and that the males from Bihar and Bengal, which I have identified with the former species, belong in reality to the latter.

## **Myrmarachne tristis**, E. Simon. (♀)

(Plate xxxii, fig. 3.)

This species was first described by Simon in *Ann. Soc. Ent. France*, 1889, p. 115, but the description is based on a ♂ specimen. Peckham also describes the species but gives no diagrams of the epigynum or other ♀ characters, although he gives measurements of the ♀ type. I have found 3 females in the Indian Museum collection which I have identified as belonging to this species.

Calcutta (*F. H. Gravely*).
Madras.
Madras (*Prof. Ramunni Menon*).

*Measurements.*

Calcutta specimen.

Total length 6·2 mm.
Cephalothorax: length 3 mm.; width 1·4 mm.
Legs 4312.

Peckham's description of this species in "*Ant-like Spiders*" holds for these specimens. A few additional observations may, however, be added. The eyes of the 2nd row are situated about midway between the first and the 3rd rows; there are 7 teeth on the inferior and 4 on the superior margin of the falces; there are 4 pairs of spines on the anterior tibia and 2 pairs on the anterior metatarsus, while there are 3 pairs of spines on the tibia of the 2nd leg.

The 1st tibia is black-lined anteriorly and the femur posteriorly; similarly, the 2nd femur has a black line on its anterior margin The abdomen is olivaceous with a dark band running across the middle of the posterior two-thirds of the abdomen, which is depressed ventrally.

The epigynum has a characteristic shape (pl. xxxii, fig. 3). There are two obliquely elliptical white areas, between which lie the chitinous genitalia. The latter consist of two halves which meet about midway but are separated anteriorly and posteriorly.

### **Myrmarachne laetus**, Thorell.

*Ascalus laetus*, Thorell, *Spiders of Burma*, 1895, p. 320.
*Synemosyna laeta*, Thorell, *Ann. Mus. Genova* XXV, p. 339 (1887).

This is the commonest ant-like spider in India. The Museum collection contains 6 specimens of the male of this species, of which 3 were collected by Prof. Ramunni Menon at Madras, one by Mr. Gravely and another by Mr. L. L. Fermor at Calcutta, and the last has been obtained from the Nicobars.[1]

One female specimen from Madras was collected by Prof. Ramunni Menon and another by Mr. Paiva from Katihar (Purnea district) in Bihar.

*Measurements.*

(Calcutta ♂ specimen).

Total length 7 mm.
Cephalothorax: length 3·1 mm.; width 1·5 mm.
Falces 2·1 mm.
Legs 4132.

The specimens agree in almost all essential features with the description given by Thorell; a few minor points brought out by the examination of the males may be noted here. It may be mentioned that I have compared these specimens carefully with an identified specimen of this species sent to the Indian Museum by A. S. Hirst from the Brit. Mus. collection.

The falces are divisible into two portions: a small basal portion from which the greater part of the falx is separated by a constriction. This basal portion is very prominent in some specimens, while in others it is sunk in the cephalothorax, but can be

[1] Since the above was written I have got three more ♂ specimens, one collected by Mr. Gravely at Calcutta, the other by Mr. Kemp at Port Blair (Andamans) and the third by Mr. Paiva at Katihar, Purnea (Bihar).

seen with a little difficulty. As regards the colour, the Indian specimens are darker than the Brit. Mus. specimen in the cephalic part, the falces and the abdomen.

### **Myrmarachne laetus** var. **flavus**, n. var. (♂)

A specimen, collected by Mr. Paiva at Katihar, resembles *M laetus* very closely, but there are the following differences. The fang is devoid of a tooth in the middle which is present in *M laetus*. As regards the colour, this variety is distinctly pale yellow. The falces are pale yellow, with a blackish patch on the dorsal surface. The cephalic part is black dorsally, but laterally it is light brown like the thoracic part. The abdomen is yellowish anteriorly but black in the posterior two-thirds.

### **Myrmarachne providens** (Peckham).

Peckham, *Ant-like Spiders*, 1892.

One specimen was collected by me at Navankot (Lahore). This species is very similar to *M. laetus* but differs in the smaller size of the falces, which are more strongly rounded towards their exterior margin.

### **Myrmarachne himalayensis**, sp. nov.

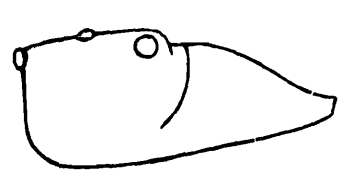
(Plate xxxii, figs. 5*a-c*.)

Two ♂ specimens of this species were collected by Mr. Gravely at Ghumti in the Darjiling district, at a height of about 4000 ft. Unfortunately the abdomen is separated from the cephalothorax in both specimens; otherwise, the specimens are quite whole and all structures can be made out easily.

*Measurements.*

Total length 7 mm.
Cephalothorax: length 3·2 mm.; width 2 mm.; cephalic part 1·7 mm.
Falces 1·6 mm.
Legs 1432.

The cephalothorax is moderately high, the cephalic part being a little higher than the thoracic. The constriction between the cephalic and thoracic part is not so deep as in *M tristis* or *M laetus*, and it is only just indicated. The cephalic part is a little convex dorsally, almost flat, but rounded on the sides. The thoracic part begins a little lower than the cephalic and slopes gradually to its posterior margin which is fairly broad. The quadrangle of eyes is one-fourth wider than long and occupies about one-half



TEXT-FIG. 2.—Cephalothorax of *Myrmarachne himalayensis*, sp. nov., from the side.

of the cephalothorax. The anterior eyes are in a recurved row and are bent somewhat downwards. The middle eyes are situated about midway between the first and 3rd rows.

The falces (pl. xxxii, fig. 5*a*) are comparatively short and stout and are divergent. The unguis bears on its " marge inférieure" 5 minute teeth, but on its superior margin there are 7 larger teeth. The fang is bent almost at right angles just a little above its base, where it is also constricted. The lip is longer than wide and there is a constriction about its middle (pl. xxxii, fig. 5*c*). The relative position and shape of the lip, maxillary process of the palp and coxa are also shown in fig. 5*c*. In the palpus, both the tibia and tarsus are flattened and constitute the palpal organ. A ventral view of the right palpal organ is shown in pl. xxxii, fig. 5*b*.

The coxae of the 1st leg are separated by less than the width of the lip and are nearly approaching. The 1st femur is specially thick and the tibia of the 1st leg bears 2 rows of 6 long and strong spines on its underside. The 2nd tibia bears three shorter and thinner spines.

The sternum is long and narrow and is pointed both anteriorly and posteriorly. The pedicle is moderately long. The abdomen is long and oval with a constriction in the anterior third.

*Colour.*—The cephalothorax is dark brown, but black round the eyes. A number of white hairs arise about the anterior eyes and also from the clypeus. The falces are dark brown and rugose dorsally; ventrally the colour is lighter. The lip is darker in colour than the maxillary processes of the palps which are medium brown. The last two legs are darker than the 1st two, which are yellowish in colour. The 1st femur is dark brown. The sternum is medium brown.

The posterior two-thirds of the abdomen dorsally and laterally are shining and smooth and are of a testaceous colour; the anterior portion is of a dull greenish-brown tinge. In the mid-ventral line there is a broad yellowish band, while ventro-laterally there is a series of furrows and ridges running longitudinally.

### **Myrmarachne ramunni,** sp. nov. (♂)

(Plate xxxii, figs. 4*a-c*.)

Some 13 ♂ specimens of this species were collected by Prof. Ramunni Menon at Madras and sent to the Indian Museum in two lots. They are referred to a new species on account of the peculiarities in the falces and the abdomen.

*Measurements.*

Total length 6 mm.
Cephalothorax: length 3 mm.; width 1·7 mm.
Falces 3 mm. long; 1 mm. wide.
Legs 4132.

The cephalic part is high and rounded on the sides. There is a constriction behind the dorsal eyes which cuts much more deeply into the sides of the cephalothorax than into the upper surface. The thoracic part is just a little lower than the cephalic; its highest part is in the anterior third, from which it slopes down in all directions, the slope being steeper on the sides than posteriorly. The posterior margin of the thorax is considerably narrower than the middle portion, where it is broadest. The quadrangle of eyes is more than a third wider than long and wider behind than in front. The first row of eyes is bent a little downward with the eyes close together; the 2nd row of eyes is about midway between the 1st and 3rd rows.

The most characteristic feature which distinguishes this species at once from others is the shape of the falces (*cf.* pl. xxxii, figs. 4*a*, 4*b*). They are long, stout structures with their proximal halves compressed from side to side, and elliptical in transverse section; while the distal halves are convexly flat dorsally and ridged ventrally and triangular in transverse section, the dorsal surface forming the base of the triangle. At the junction of the two halves, there is, so to speak, a regular twist through a right angle, the outer edge of the distal half being continued into the mid-dorsal ridge of the elliptical posterior half of the falx. Looked at from the side the falx is sinuous and possesses a short basal piece as in *M laetus*. Ventrally there is a row of 9 small teeth on the outer edge and a row of 17 larger teeth on the inner edge of the falx. The fang is as long as the falx and has a curve at the base and a bend at the apex. The right palpus from below is shown in pl. xxxii, fig. 4*c*. The tibia of the 1st leg bears two rows of five spines each on its underside and the femur has one spine dorsally. The lip is longer than broad and the sternum is truncate anteriorly.

The abdomen also is characteristic. Out of 13 specimens almost all have got their abdomens flexed; in some it is only bent, while in others it is distinctly vertical, the posterior two-thirds bending on the anterior third. It is long and oval, but is not constricted. Dorsally it is convex and hard with chitin, while ventrally it is soft and flat.

*Colour.*—The cephalothorax is medium brown, the cephalic part with an olivaceous tinge dorsally. Both the cephalic and the thoracic parts are covered with short white hairs which also line the constriction behind the dorsal eyes specially towards the sides. The falces are dark brown in colour. The abdomen is brown and is covered with glistening yellowish-white hairs. There are white hairs on the sides at the anterior third. The posterior legs are darker in colour than the anterior. The metatarsus and tarsus in all the legs are darker than the other joints.

This species is closely allied to *M. manducator* (Westwood, *Mag. de Zool.* Anneé 1841, pl. i) from which it differs in the following points: the twist in the falx is characteristic of this species; the number of teeth on the "marge inférieure" is 17 and not 9

(5 anterior and 4 posterior) as shown by Westwood for *M manducator*; the double curve of the fang is absent here and, lastly, the maxillary process of the palp has sharp bendings and is not rounded as in the other species.

**Myrmarachne uniseriatus**, sp. nov. (♂)

(Plate xxxii, figs. 6*a-b*.)

This small spider belongs to a new species and was collected by Prof. Ramunni Menon at Madras.

*Measurements.*

Total length 4·2 mm.
Cephalothorax: length 2 mm.; width 1·1 mm.
Falces 0·8 mm.
Legs 4123.

The cephalothorax is moderately high; the cephalic part is limited behind by a shallow transverse depression and not by a sharp constriction as in most other species. Laterally there is a crescentic groove to separate the cephalic from the thoracic part. The anterior thoracic part is at about the same level as the cephalic, behind which the thorax slants posteriorly. As in most species the thoracic part narrows behind. The quadrangle of eyes is more than one-third wider than long and occupies two-fifths of the cephalothorax. The anterior eyes are close together in a recurved row, the middle being twice as large as the lateral. The 2nd row is nearer the first than the third row. The dorsal eyes are of the same size as the lateral.

The characteristic feature which distinguishes it readily from other species is that it has only one row of 10 teeth on the ventral side of the falces. These teeth are situated quite towards the inner margin and therefore belong to the "marge supérieure"; the teeth on the inferior margin are thus absent. The teeth present are larger towards the apex and smaller towards the base of the fang. It will be seen that in most of the species, as for example *M. laetus*, *M. himalayensis* and *M. ramunni*, the teeth on the inferior margin, or outer row, are smaller, both in number and size, than those of the superior margin. In the present species we have reached an extreme of this condition of the reduction of teeth on the "marge inférieure." Besides, the fang has an extra tooth on its underside somewhere about the middle of its length (pl. xxxii, fig. 6*a*). The lip is longer than wide and there are 2 rows of 4 spines each on the under side of the 1st tibia, and 2 rows of 2 spines on the 2nd tibia. The abdomen is long and oval and there is only an indication of a constriction at the anterior third—nothing like what we find in other species.

*Colour.*—The cephalothorax is light brown in colour except round the eyes, where it is black. There are white hairs both on the cephalothorax and the clypeus. The falces are brown, but the

fangs are of a deeper colour. The legs are yellowish. Dorsally, the abdomen is covered with two chitinous pieces which bear some resemblance to the pieces of a carapace. The anterior piece occupies a little more than one-fourth of the abdomen and the posterior, which is larger, covers the rest of it. It is shining and olivaceous dorsally but white ventrally. It is sparsely covered with white hairs dorsally but thickly on its ventral side.

### **Myrmarachne manducator,** Westwood. (♂)

(Plate xxxii, fig. 7.)

*Salticus manducator,* Westwood, *Mag. de Zool.*, 1841, pl. i.
*Salticus luridus,* Simon, *Bull. Soc. Zool. France,* 1885, p. 453.
*Ascalus manducator,* Thorell, *Spiders of Burma,* 1895, p. 323.

There is one specimen of this species in the collection sent by Mr. Mackenzie from Siripur, Saran (Chapra) in Bihar. It has already been recorded from Singapore and Tharawaddy (Burma). Westwood gives its locality as " India septentrionali."

The only contribution I have made is a diagram of the ♂ palpus (pl. xxxii, fig. 7) which is not found in the literature cited.

### **Myrmarachne paivae,** sp. nov. (♂)

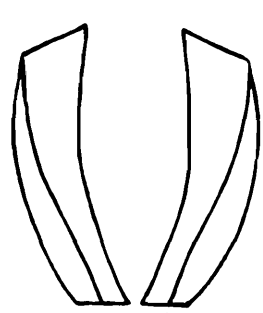
(Plate xxxii, fig. 8.)

This new species is described from a specimen collected by Mr. Paiva at Katihar in the Purnea district (Bihar). It is one of the largest ant-like spiders in the Indian Museum collection.

*Measurements.*

Total length 8·1 mm.
Cephalothorax : length 4 mm.; width 2 mm.; cephalic part 1·7 mm.; thoracic part 2·3 mm.
Legs 4132.

The cephalothorax is moderately high; the cephalic part is only a little higher than the thoracic. There is a constriction separating the cephalic from the thoracic part, which cuts much more deeply into the sides than dorsally. The thoracic part is distinctly longer than the cephalic and has a hump which slopes abruptly behind. The cephalic part is rounded dorsally and laterally and, being rather short, gives a rounded appearance as a whole. The quadrangle of eyes is one-fourth wider than long, wider behind than in front and occupies less than one-third of the cephalothorax. The anterior eyes are in a recurved row and the middle row is nearer the first than the third. The dorsal eyes are just a little larger than the lateral and are placed on the side of the cephalothorax.



TEXT-FIG. 3.—Falces of *Myrmarachne paivae,* sp. nov., from above.

The falces are characteristic. They are long and horizontal; they are not flattened on the upper surface but the inner face of each falx slants downwards and inwards from the upper edge so that the two only meet along the line of their lower edges, not along the whole surface of the inner faces, as is usually the case. It agrees in this feature with *Salticus imbellis* (Peckham, *Ant-like Spiders*, 1892). In the present species, however, the inner edge of the falces is also curved like the outer and the outer edge at the distal extremity passes into a ridge situated on the upper face of the falces behind (*cf. M ramunni* above). There are 11 large teeth in the inner row and 9 smaller teeth in the outer row of teeth of the falx. The lip is longer than wide and the sternum is elongated and pointed anteriorly as well as posteriorly. The tibia of the 1st leg has 6 pairs of spines and the tibia of the 2nd leg has 3 pairs of spines on their under surfaces.

*Colour.*—The spider is of a dark olivaceous colour dorsally, the cephalic part is darker, almost black, while the thoracic has a brownish tinge, the abdomen being paler towards its anterior third. There are white hairs about the anterior eyes and the clypeus; on the latter, they arise from the sides and are bent in towards the middle line. The falces are reddish-brown and are also covered with white hairs. The legs are of the same colour as the cephalothorax, except the first which has a much lighter colour. The coxa and trochanter of the first and the trochanter of the fourth are pale white. Ventrally, the abdomen is of a yellowish colour with longitudinal blackish lines. The 1st femur is black-lined anteriorly and posteriorly; the metatarsus and tarsus of the 2nd and 3rd legs are yellowish-white.

This species is closely allied to *Salticus imbellis* from which it differs in size, shape of the cephalothorax, disposition and size of the eyes and the colouration.

### **Myrmarachne satarensis**, sp. nov. (♂)

(Plate xxxii, fig. 9.)

The description of this new species is based on a specimen collected by Mr. Gravely at Helvak, Koyna Valley in the Satara district (Bombay) at a height of about 2000 ft.

*Measurements.*

Total length 9 mm.
Cephalothorax: 3·5 mm. long; 1·6 mm. wide.
Pedicle 2·1 mm. long; 0·35 mm. wide.
Legs 4132.

The cephalothorax is moderately high; the thoracic part is dome-shaped and is as high as the cephalic, not lower, and is one-fifth longer than the cephalic. The cephalic part is separated from the thoracic by a constriction which cuts deeply into the sides. It is convex dorsally and is also rounded at the sides. The quadrangle

of eyes is two-fifths wider than long, wider behind than in front and occupies about two-sevenths of the cephalothorax. The first row of eyes is a little bent downward and is recurved. The 2nd row is nearer the first than the 3rd row. The dorsal eyes are of about the same size as the anterior lateral. The pedicle is very long indeed, more than 2 mm. in length, the longest I have seen so far in these spiders; it is biarticulate. The falces are short and stout and a little oblique. The sternum is long and narrow and the lip is longer than wide. The abdomen is long and oval and has a constriction in the anterior third. The structure of the epigynum is shown in pl. xxxii, fig. 9.

*Colour.*—The cephalic part is of a deep blue colour; in strong light it gives a metallic, burnished lustre. The thoracic part, the pedicle and the falces are medium brown. The palps are also of a shining blue colour. The abdomen is darkish, olivaceous or dull black behind the constriction; anteriorly it is greyish-white. There are white hairs on the clypeus and also in the constriction between the cephalic and the thoracic parts. There are two white oblique bands, one on each side of the abdomen, running behind and from the abdominal constriction; they meet dorsally on the constriction. The last two legs are dark brown, but the 1st two are pale white in colour. The patella and tibia of the 1st leg and the trochanter, femur, patella and tibia of the 2nd leg are black-lined anteriorly. The tibia of the 1st leg bears 2 rows of 4 spines and that of the 2nd leg bears 2 rows of 3 spines on its under surface.

This species is allied to *M. praelonga* (=*Synemosyna praelonga*), Thorell (*Ann. Mus. Genova*, XXX, p. 64, 1890) from which it is easily distinguished by the depression and convexity of the cephalic part, the great length of the pedicle and also by the colour.

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## EXPLANATION OF PLATE XXXII.

FIG. 1*a*.—*Harmochirus lloydii*, first leg as seen from the ventral side; 1*b*, falces from below; 1*c*, lip and the maxillary processes of the palps.

,, 2.—Epigynum of *Myrmarachne incertus*.

,, 3.—Epigynum of *Myrmarachne tristis*.

,, 4*a*.—*Myrmarachne ramunni*, falces of the ♂ from above; 4*b*, falx and fang as seen from the side; 4*c*, male palpus.

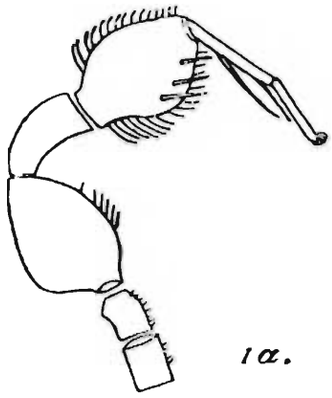
,, 5*a*.—*Myrmarachne himalayensis*, falces of the ♂ from above; 5*b*, male palpus; 5*c*, relative positions of the lip, maxillary process of the palp and the base of the first leg.

,, 6*a*.—*Myrmarachne uniseriatus*, falx from below; 6*b*, male palpus.

,, 7.—Male palpus of *Myrmarachne manducator*.

,, 8.—Male palpus of *Myrmarachne paivae*.

,, 9.—Epigynum of *Myrmarachne satarensis*.



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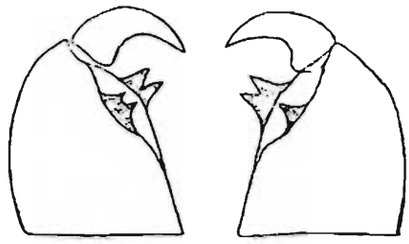

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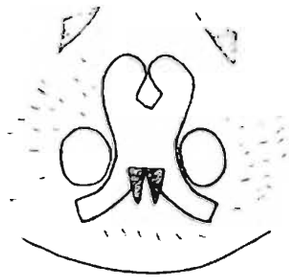
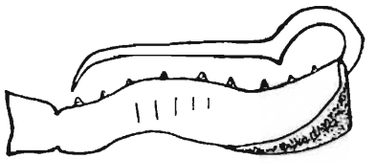


2.

1c.



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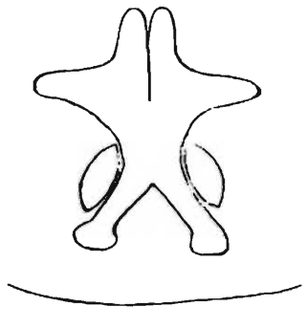

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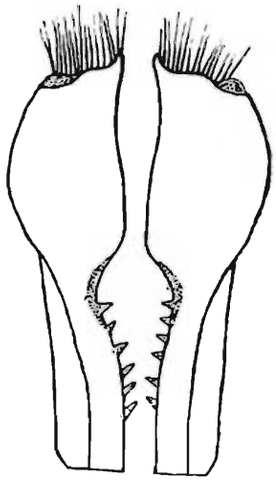

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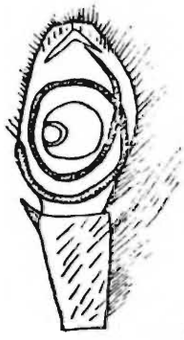

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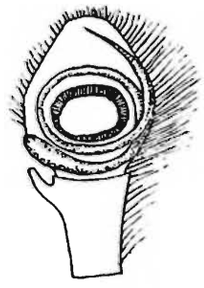

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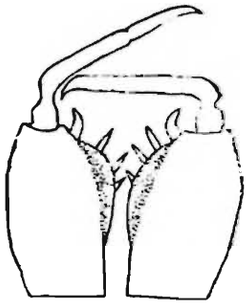

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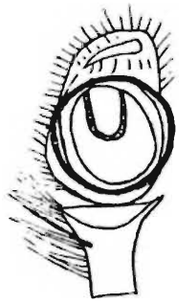

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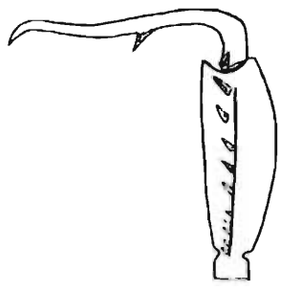

6a.

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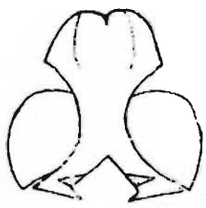

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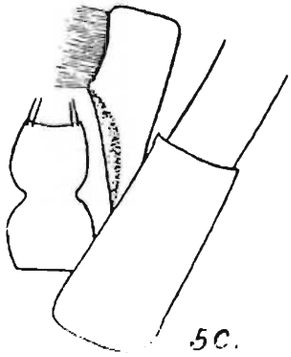

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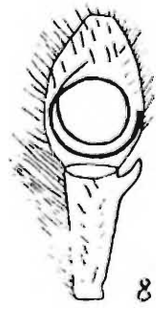

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